DHINGRA, Lachman Dass, 1936-
THE COMPARATIVE AND TOPOGRAPHIC ANATOMY
OF THE ARTERIES OF THE TURKEY (MELEAGRIS
GALLOPAVO), CHICKEN (GALLUS DOMESTICUS),
GOOSE (ANSER ANSER), AND DUCK (ANAS
PLATYRHYNCHOS).

The Ohio State University, Ph.D., 1968
Anatomy

University Microfilms, Inc., Ann Arbor, Michigan
THE COMPARATIVE AND TOPOGRAPHIC ANATOMY OF THE ARTERIES
OF THE TURKEY (MELEAGRIS GALLOPAVO), CHICKEN
(GALLUS DOMESTICUS), GOOSE (ANSER ANSER),
AND DUCK (ANAS PLATYRHYNCHOS)

DISSERTATION
Presented in Partial Fulfillment of the Requirements for
Degree Doctor of Philosophy in the Graduate
School of The Ohio State University

By
Lachman Dass Dhingra, B.V.Sc. & A.H.

* * * * * *

The Ohio State University
1968

Approved by

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ACKNOWLEDGMENTS

The author sincerely acknowledges the guidance, counsel, constructive criticism, inspiration for learning and impetus for research afforded by his adviser Dr. Walter G. Venzke, Professor and Chairman, Department of Veterinary Anatomy, The Ohio State University, during this investigation and throughout the years of graduate education. His sagacious and scholarly philosophy created an environment conducive to learning and achievement.

He also wishes to gratefully acknowledge the advice and assistance afforded by Dr. Charles D. Diesem, Professor of Veterinary Anatomy.

To Dr. Martin Y. Andres, Dr. William K. Latshaw and Dr. Maureen Hunter, Professors in the Department of Veterinary Anatomy, the writer expresses his appreciation for their cooperation. Mrs. June D. Kern, Technical Assistant, generously gave her time when asked.

Moreover, the writer also wishes to express his appreciation to all of those professors from the College of Medicine, Department of Biochemistry, College of Biological Sciences and Department of Classical Languages who contributed to his graduate education.

The author acknowledges the help of Mr. Batwin Kramer, Veterinary Medical Illustrator who made very pertinent comments and suggestions concerning the illustrations.
The writer is grateful for the encouragement and inspiration for research afforded by Dr. Wayne B. Parrish, Director, Electron Microscope Laboratory, College of Biological Sciences under whom the ultrastructure of the chicken blood cells was studied, and to Dr. Beth L. Wismar, Professor of Anatomy, College of Medicine, the author expresses gratitude for the guidance afforded to him in studying the microscopic structure of the arteries of the turkey, chicken, goose and the duck.

The author is very thankful to have Prem, Pinki and Rosy who have gracefully done without him so that this work might be completed.

To the Panjab Agricultural University and The Ohio State University who gave financial assistance for this endeavor, the author is highly grateful.
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## TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACKNOWLEDGMENTS</td>
<td>ii</td>
</tr>
<tr>
<td>VITA</td>
<td>iv</td>
</tr>
<tr>
<td>LIST OF TABLES</td>
<td>vii</td>
</tr>
<tr>
<td>LIST OF ILLUSTRATIONS</td>
<td>viii</td>
</tr>
<tr>
<td>INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>Chapter</td>
<td></td>
</tr>
<tr>
<td>LITERATURE REVIEW</td>
<td>4</td>
</tr>
<tr>
<td>MATERIAL AND METHODS</td>
<td>24</td>
</tr>
<tr>
<td>RESULTS</td>
<td>27</td>
</tr>
<tr>
<td>The arteries of the male turkey</td>
<td>27</td>
</tr>
<tr>
<td>The arteries of the female turkey</td>
<td>117</td>
</tr>
<tr>
<td>The arteries of the male chicken</td>
<td>124</td>
</tr>
<tr>
<td>The arteries of the female chicken</td>
<td>150</td>
</tr>
<tr>
<td>The arteries of the male goose</td>
<td>150</td>
</tr>
<tr>
<td>The arteries of the female goose</td>
<td>248</td>
</tr>
<tr>
<td>The arteries of the male duck</td>
<td>251</td>
</tr>
<tr>
<td>The arteries of the female duck</td>
<td>282</td>
</tr>
<tr>
<td>DISCUSSION</td>
<td>286</td>
</tr>
<tr>
<td>SUMMARY</td>
<td>295</td>
</tr>
<tr>
<td>BIBLIOGRAPHY</td>
<td>298</td>
</tr>
</tbody>
</table>

vi
# LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Terms used by Gadow and Salenka. Bird in general</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>Terms used by Kaupp. Domestic fowl</td>
<td>7</td>
</tr>
<tr>
<td>3</td>
<td>Terms used by Martin. Bird in general</td>
<td>9</td>
</tr>
<tr>
<td>4</td>
<td>Terms used by Otte. Fowl</td>
<td>10</td>
</tr>
<tr>
<td>5</td>
<td>Terms used by Grzimek. Chicken</td>
<td>12</td>
</tr>
<tr>
<td>6</td>
<td>Terms used by Sapy. Domestic bird</td>
<td>14</td>
</tr>
<tr>
<td>7</td>
<td>Terms used by Worden. Bird in general</td>
<td>17</td>
</tr>
<tr>
<td>8</td>
<td>Terms used by Bhaduri et al. Pigeon</td>
<td>18</td>
</tr>
<tr>
<td>9</td>
<td>Terms used by Callegary and Vegetti. Fowl</td>
<td>22</td>
</tr>
</tbody>
</table>
# LIST OF ILLUSTRATIONS

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The branches of the arcus aorta (Turkey)</td>
<td>29</td>
</tr>
<tr>
<td>2</td>
<td>Schematic illustration of the topographic anatomy of the viscera. Ventral View (Turkey)</td>
<td>29</td>
</tr>
<tr>
<td>3</td>
<td>The branches of the arteria carotis communis (Turkey)</td>
<td>35</td>
</tr>
<tr>
<td>4</td>
<td>The arteries of the neck (Turkey)</td>
<td>35</td>
</tr>
<tr>
<td>5</td>
<td>The branches of the arteria carotis communis (Turkey)</td>
<td>35</td>
</tr>
<tr>
<td>6</td>
<td>The branches of the arteria carotis externa (Turkey)</td>
<td>35</td>
</tr>
<tr>
<td>7</td>
<td>The branches of the arteria carotis interna (Turkey)</td>
<td>35</td>
</tr>
<tr>
<td>8</td>
<td>The branches of the arteria carotis cerebralis (Turkey)</td>
<td>50</td>
</tr>
<tr>
<td>9</td>
<td>Dorsal view of the brain (Turkey)</td>
<td>50</td>
</tr>
<tr>
<td>10</td>
<td>Schematic illustration of the arteries of the brain (Turkey)</td>
<td>50</td>
</tr>
<tr>
<td>11</td>
<td>Schematic illustration of the branches of the arteria thoracica communis (Turkey)</td>
<td>62</td>
</tr>
<tr>
<td>12</td>
<td>Schematic illustration of the topographic anatomy of the pectoral region (Turkey)</td>
<td>63</td>
</tr>
<tr>
<td>13</td>
<td>Schematic illustration of the arteries of the wing (Turkey)</td>
<td>70</td>
</tr>
<tr>
<td>14</td>
<td>Schematic illustration of the arteries of the wing (Turkey)</td>
<td>70</td>
</tr>
<tr>
<td>15</td>
<td>Schematic illustration of the arteries of the wing (Turkey)</td>
<td>70</td>
</tr>
<tr>
<td>Figure</td>
<td>Page</td>
<td></td>
</tr>
<tr>
<td>--------</td>
<td>------</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>71</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>79</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>85</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>85</td>
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<tr>
<td>20</td>
<td>85</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>92</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>92</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>103</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>107</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>107</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>107</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>107</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>107</td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>107</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>118</td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>119</td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>119</td>
<td></td>
</tr>
</tbody>
</table>

ix
<table>
<thead>
<tr>
<th>Figure</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>33</td>
<td>123</td>
</tr>
<tr>
<td>34</td>
<td>123</td>
</tr>
<tr>
<td>35</td>
<td>123</td>
</tr>
<tr>
<td>36</td>
<td>123</td>
</tr>
<tr>
<td>37</td>
<td>127</td>
</tr>
<tr>
<td>38</td>
<td>127</td>
</tr>
<tr>
<td>39</td>
<td>127</td>
</tr>
<tr>
<td>40</td>
<td>133</td>
</tr>
<tr>
<td>41</td>
<td>134</td>
</tr>
<tr>
<td>42</td>
<td>137</td>
</tr>
<tr>
<td>43</td>
<td>138</td>
</tr>
<tr>
<td>44</td>
<td>144</td>
</tr>
<tr>
<td>45</td>
<td>145</td>
</tr>
<tr>
<td>46</td>
<td>146</td>
</tr>
<tr>
<td>47</td>
<td>151</td>
</tr>
<tr>
<td>48</td>
<td>158</td>
</tr>
<tr>
<td>Figure</td>
<td>Description</td>
</tr>
<tr>
<td>--------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>49</td>
<td>Schematic illustration of the branches of the arteria carotis communis (Goose)</td>
</tr>
<tr>
<td>50</td>
<td>Schematic illustration of the branches of the arteria carotis communis (Goose)</td>
</tr>
<tr>
<td>51</td>
<td>Schematic illustration of the branches of the arteria carotis externa and the arteria carotis interna (Goose)</td>
</tr>
<tr>
<td>52</td>
<td>The branches of the arteria carotis communis at the cranial end of the neck (Goose)</td>
</tr>
<tr>
<td>53</td>
<td>Schematic illustration of the arteries of the brain. Dorsolateral View. (Goose)</td>
</tr>
<tr>
<td>54</td>
<td>Schematic illustration of the arteries of the brain. Ventral View. (Goose)</td>
</tr>
<tr>
<td>55</td>
<td>Schematic illustration of the arteries of the brain. Dorsal View. (Goose)</td>
</tr>
<tr>
<td>56</td>
<td>Schematic illustration of the arteria thoracica externa communis (Goose)</td>
</tr>
<tr>
<td>57</td>
<td>Schematic illustration of the arteries of the wing (Goose)</td>
</tr>
<tr>
<td>58</td>
<td>Schematic illustration of the muscles and arteries of the wing (Goose)</td>
</tr>
<tr>
<td>59</td>
<td>Schematic illustration of the muscles and arteries of the wing (Goose)</td>
</tr>
<tr>
<td>60</td>
<td>Schematic illustration of the arteria celiaca (Goose)</td>
</tr>
<tr>
<td>61</td>
<td>Schematic illustration of the arteria celiaca (Goose)</td>
</tr>
<tr>
<td>62</td>
<td>Schematic illustration of the arteria gastrica sinistra (Goose)</td>
</tr>
<tr>
<td>63</td>
<td>Schematic illustration of the arteria gastrica dextra (Goose)</td>
</tr>
<tr>
<td>64</td>
<td>Schematic illustration of the terminal branches of the arteria gastrica dextra (Goose)</td>
</tr>
<tr>
<td>Figure</td>
<td>Description</td>
</tr>
<tr>
<td>--------</td>
<td>-------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>65</td>
<td>The distribution of the arteria iliocecalsis sinistra, arteria iliocecalsis dextra and the arteria mesenterica caudalis (Goose)</td>
</tr>
<tr>
<td>66</td>
<td>Schematic illustration of the arteria mesenterica cranialis (Goose)</td>
</tr>
<tr>
<td>67</td>
<td>Schematic illustration of the descending aorta (Goose)</td>
</tr>
<tr>
<td>68</td>
<td>Schematic illustration of the arteria ischidica. Lateral view. (Goose)</td>
</tr>
<tr>
<td>69</td>
<td>Schematic illustration of the arteria iliaca externa and the arteria ischidica. Medial view of the thigh (Goose)</td>
</tr>
<tr>
<td>70</td>
<td>Schematic illustration of the arteria ischidica at the level of the ischidic foramen (Goose)</td>
</tr>
<tr>
<td>71</td>
<td>The distribution of the arteria ischidica (Goose)</td>
</tr>
<tr>
<td>72</td>
<td>The arteries of the pelvic limb (Goose)</td>
</tr>
<tr>
<td>73</td>
<td>The distribution of the arteria poplitea (Goose)</td>
</tr>
<tr>
<td>74</td>
<td>Schematic illustration of the arteria ischidica (Goose)</td>
</tr>
<tr>
<td>75</td>
<td>The distribution of the arteria dorsalis pedis (Goose)</td>
</tr>
<tr>
<td>76</td>
<td>Schematic illustration of the topographic anatomy of the viscera in the female goose</td>
</tr>
<tr>
<td>77</td>
<td>Schematic illustration of the female genitalia in the goose</td>
</tr>
<tr>
<td>78</td>
<td>Schematic illustration of the arteries of the female genitalia in the goose</td>
</tr>
<tr>
<td>79</td>
<td>Schematic illustration of the major branches of the truncus brachiocephalicus (Duck)</td>
</tr>
<tr>
<td>80</td>
<td>The branches of the arteria carotis externa (Duck)</td>
</tr>
<tr>
<td>81</td>
<td>The branches of the arteria carotis interna (Duck)</td>
</tr>
<tr>
<td>Figure</td>
<td>Description</td>
</tr>
<tr>
<td>--------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>82</td>
<td>The branches of the arteria carotis communis at the level of the thyroid gland (Duck)</td>
</tr>
<tr>
<td>83</td>
<td>Schematic illustration of the arteria carotis communis and the arteria thoracica communis (Duck)</td>
</tr>
<tr>
<td>84</td>
<td>Schematic illustration of the cutaneous arteries in the pectoral region (Duck)</td>
</tr>
<tr>
<td>85</td>
<td>The distribution of the arteria thoracica externa communis (Duck)</td>
</tr>
<tr>
<td>86</td>
<td>Schematic illustration of the arteries of the wing (Duck)</td>
</tr>
<tr>
<td>87</td>
<td>Schematic illustration of the arteria celiaca (Duck)</td>
</tr>
<tr>
<td>88</td>
<td>Schematic illustration of the arteria celiaca (Duck)</td>
</tr>
<tr>
<td>89</td>
<td>Schematic illustration of the branches of the descending aorta (Duck)</td>
</tr>
<tr>
<td>90</td>
<td>Schematic illustration of the arteria ischiadica (Duck)</td>
</tr>
<tr>
<td>91</td>
<td>The arteries of the female genitalia in the duck</td>
</tr>
<tr>
<td>92</td>
<td>Schematic illustration of the female genitalia in the duck</td>
</tr>
</tbody>
</table>
INTRODUCTION

The anatomy of the domestic birds deserves attention for several reasons. The birds are important economically and especially the chicken is an excellent experimental animal. It is easy to handle and is resistant to infections following surgery. Its external characteristics give an indication of the endocrine status particularly with reference to the gonadal hormones. In a recent survey by a team of Canadian nutrition experts, an analysis of the average Indian diet in several states showed a deficiency of between 30 and 40 percent in proteins, minerals and vitamins which are most essential for general health. Supporting this view, the government of India is proposing to increase egg and meat production during the fourth five-year plan, so that an average Indian may obtain sufficient eggs and poultry to avoid malnutrition (33). The importance of poultry in the production of food and the resultant income to the producer is frequently overlooked by the promoters of rural development. The poultry population can be increased more rapidly than that of other farm animals and therefore poultry development offers an opportunity for a higher standard of nutrition and for solving the food problem. A sizeable work has been done on different aspects of poultry production, poultry nutrition, poultry physiology, poultry pathology and poultry management, but poultry anatomy, and especially the arterial system, which is the pivot of
the body systems, has not been studied in detail. There are only frag­
mentary reports on the gross anatomy of the arterial system of the
chicken and relatively little is known concerning the arterial system
of the turkey, goose and the duck. Accordingly, it was proposed to
investigate the arteries of the aforementioned birds. The following
account deals with the comparative and topographic anatomy of the
arteries of the turkey, chicken, goose and duck. The gross anatomy of
the arterial system of the domestic turkey (Meleagris gallopavo) and
the domestic goose (Anser anser) is described in detail, and the arter­
ies of the chicken (Gallus domesticus) and the domestic duck (Anas
platyrhynchos) are compared to the domestic turkey and the domestic
goose respectively. The taxonomic position of these birds in the class
aves is as follows:

Class-Aves

Subclass-Neornithes

Order-Galliformes

Superfamily-Phasianoidea

Family-Meleagridae

Genus-Meleagris

Species-Meleagris gallopavo, domestic turkey.

Family-Phasiandae

Genus-Gallus

Species-Gallus domesticus, chicken.
Order-Anseriformes

Family-Anatidae

Subfamily-Anserinae

Genus-Anser

Species-Anser anser, domestic goose.

Subfamily-Anatinae

Genus-Anas

Species-Anas platyrhynchos, domestic duck.
LITERATURE REVIEW

Early accounts of the arterial system of the bird were given by Tiedeman (37), Barkow (4), Rathke (34), and Gadow and Salenka (16) in the Nineteenth Century. Rathke described the common carotid arteries of the bird, while the others discussed the main vessels without going into the finer details of their ramifications. Their accounts of the arterial system did not materially differ from each other, but the nomenclatural differences were significant. The terms used by Gadow and Salenka are given in Table 1.

In 1918, Kaupp in The Anatomy of the Domestic Fowl (19) reported on the arterial system of the domestic fowl. His description covered the main vessels, and a mixture of Latin and anglicized nomenclature was used in describing the arteries. The terms used in his text are tabulated in Table 2.
<table>
<thead>
<tr>
<th>Aorta</th>
<th>A. anonyma S. innominata S. brachiocephalica</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. anonyma S. innominata S. brachiocephalica</td>
<td>Truncus caroticus S. A. Carotis Communis</td>
</tr>
<tr>
<td>A. vertebralis</td>
<td></td>
</tr>
<tr>
<td>A. vertebralis descendens S.</td>
<td></td>
</tr>
<tr>
<td>A. a. intercostalis suprema</td>
<td></td>
</tr>
<tr>
<td>A. vertebralis ascendens</td>
<td></td>
</tr>
<tr>
<td>A. comes nervi vagi</td>
<td></td>
</tr>
<tr>
<td>A. subcutanea colli</td>
<td></td>
</tr>
<tr>
<td>A. cervicallis superior</td>
<td></td>
</tr>
<tr>
<td>A. carotis cerebralis S. interna</td>
<td></td>
</tr>
<tr>
<td>A. occipitalis</td>
<td></td>
</tr>
<tr>
<td>A. occipitalis sublimis</td>
<td></td>
</tr>
<tr>
<td>A. occipitalis profunda</td>
<td></td>
</tr>
<tr>
<td>A. meningea</td>
<td></td>
</tr>
<tr>
<td>A. ophthalmica externa</td>
<td></td>
</tr>
<tr>
<td>A. temporalis</td>
<td></td>
</tr>
<tr>
<td>A. ophthalmicus</td>
<td></td>
</tr>
<tr>
<td>R. ophthalmicus</td>
<td></td>
</tr>
<tr>
<td>R. ophthalmicus externa</td>
<td></td>
</tr>
<tr>
<td>Plexus temporalis</td>
<td></td>
</tr>
<tr>
<td>A. sphenoida</td>
<td></td>
</tr>
<tr>
<td>A. sphenomaxillaris</td>
<td></td>
</tr>
<tr>
<td>A. cerebralis</td>
<td></td>
</tr>
<tr>
<td>A. posterior</td>
<td></td>
</tr>
<tr>
<td>A. basilaris</td>
<td></td>
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</tr>
<tr>
<td>Aa. cerebelli inferiores</td>
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<tr>
<td>R. anterior</td>
<td></td>
</tr>
<tr>
<td>A. fossae sylviae</td>
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</tr>
<tr>
<td>A. cerebri profunda</td>
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</tr>
<tr>
<td>A. choioidea</td>
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<tr>
<td>A. ophthalmica interna</td>
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<tr>
<td>A. ethmoidalis</td>
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</tr>
<tr>
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<td></td>
</tr>
<tr>
<td>A. ethmoidalis interna</td>
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</tr>
<tr>
<td>A. carotis facialis S. externa</td>
<td></td>
</tr>
<tr>
<td>A. hyoidea</td>
<td></td>
</tr>
<tr>
<td>A. laryngea superior</td>
<td></td>
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<tr>
<td>A. lingualis</td>
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<tr>
<td>A. facialis</td>
<td></td>
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<tr>
<td>A. auricularis</td>
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</tr>
<tr>
<td>A. subclavia</td>
<td></td>
</tr>
<tr>
<td>A. sternoclavicularis S. thoracica humeralis</td>
<td></td>
</tr>
<tr>
<td>A. sternalis</td>
<td></td>
</tr>
<tr>
<td>A. clavicularis</td>
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<tr>
<td>A. thoracica</td>
<td></td>
</tr>
<tr>
<td>A. mammarica interna</td>
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<tr>
<td>Inner branch</td>
<td></td>
</tr>
<tr>
<td>Outer branch</td>
<td></td>
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<tr>
<td>A. thoracica externa</td>
<td></td>
</tr>
<tr>
<td>Terms Used by Gadow and Salenka (16)</td>
<td>Bird in General</td>
</tr>
<tr>
<td>--------------------------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>R. superior</td>
<td>A. mesenterica superior</td>
</tr>
<tr>
<td>R. inferior</td>
<td>R. iliocolicus</td>
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<tr>
<td>A. thoracica longa S. subcutanea</td>
<td>A. spermaticae</td>
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<tr>
<td>thoracis</td>
<td>Aa. lumbalis</td>
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<td>A. axillaris</td>
<td>A. cruralis</td>
</tr>
<tr>
<td>A. subscapularis</td>
<td>A. pelvina interna S. umbilicalis</td>
</tr>
<tr>
<td>A. brachialis</td>
<td>A. circumflexa femoris</td>
</tr>
<tr>
<td>A. circumflexa humeri posterior</td>
<td>A. femoris</td>
</tr>
<tr>
<td>A. collateralis ulnaris</td>
<td>A. ischiadica</td>
</tr>
<tr>
<td>A. collateralis radialis</td>
<td>R. renalis</td>
</tr>
<tr>
<td>A. radialis</td>
<td>A. tibialis postica</td>
</tr>
<tr>
<td>A. radialis recurrens</td>
<td>A. tibialis antica</td>
</tr>
<tr>
<td>A. ulnaris</td>
<td>A. mesenterica inferior S. A. haemorrhoidalis media</td>
</tr>
<tr>
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<td>A. pudenda externa</td>
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<td>A. branch to the kidney</td>
</tr>
<tr>
<td>A. celiaca</td>
<td>A. haemorrhoidalis infima</td>
</tr>
<tr>
<td>R. sinistra S. posterior</td>
<td>A. pudenda externa</td>
</tr>
<tr>
<td>R. dextra S. anterior</td>
<td>A. profunda penis</td>
</tr>
<tr>
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<td>A. coccygea media</td>
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<tr>
<td>Aa. hepatica dextra</td>
<td>A. coccygea lateralis</td>
</tr>
<tr>
<td>R. intestinalis</td>
<td></td>
</tr>
<tr>
<td>R. iliocolicus</td>
<td></td>
</tr>
<tr>
<td>TABLE 2</td>
<td></td>
</tr>
<tr>
<td>TERMS USED BY KAUPP (19) DOMESTIC FOWL</td>
<td></td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Aorta</th>
<th>A. cerebralis</th>
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<tr>
<td>A. brachiocephalica</td>
<td>A. sphenoida</td>
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<td>T. caroticus</td>
<td>A. sphenomaxillaris</td>
</tr>
<tr>
<td>Aa. thyroidea</td>
<td>A. retinae centralis</td>
</tr>
<tr>
<td>A. vertebralis</td>
<td>R. posterior</td>
</tr>
<tr>
<td>A. vertebralis posterior</td>
<td>R. anterior</td>
</tr>
<tr>
<td>A. cervicalis ascendens</td>
<td>A. sylviae</td>
</tr>
<tr>
<td>A. esophagica inferior</td>
<td>A. cerebri profunda</td>
</tr>
<tr>
<td>A. subcutanea colli</td>
<td>Choroid plexus for lateral</td>
</tr>
<tr>
<td>A. carotis cerebralis</td>
<td>ventricles</td>
</tr>
<tr>
<td>A. occipitalis</td>
<td>A. ethmoidalis</td>
</tr>
<tr>
<td>A. occipitalis sublimis</td>
<td>A. ethmoidalis interna</td>
</tr>
<tr>
<td>A. occipitalis profunda</td>
<td>A. ethmoidalis externa</td>
</tr>
<tr>
<td>A. meningea</td>
<td>A. carotis externa</td>
</tr>
<tr>
<td>A. ophthalmica externa</td>
<td>A. hyoidea</td>
</tr>
<tr>
<td>A. temporalis</td>
<td>A. laryngea superior</td>
</tr>
<tr>
<td>A. recurrens ophthalmica</td>
<td>A. lingualis</td>
</tr>
<tr>
<td>Rete temporalis</td>
<td>A. facialis</td>
</tr>
<tr>
<td>Rete ethmoidalis</td>
<td>A. auricularis</td>
</tr>
<tr>
<td>A. ethmoidalis</td>
<td>A. facialis externa</td>
</tr>
<tr>
<td>Flexus temporalis</td>
<td>A. facialis interna</td>
</tr>
<tr>
<td>Plexus alveolaris</td>
<td>A. alveolaris inferior</td>
</tr>
<tr>
<td>Plexus palpebral</td>
<td>A. mentalis</td>
</tr>
<tr>
<td>Plexus muscularis</td>
<td>A. maxillaris interna</td>
</tr>
<tr>
<td>Plexus lacrimalis</td>
<td>A. subclavia</td>
</tr>
<tr>
<td>R. ciliaris posticus</td>
<td>A. sternoclavicularis</td>
</tr>
<tr>
<td>A. meningea media</td>
<td>A. sternalis</td>
</tr>
<tr>
<td></td>
<td>A. clavicularis</td>
</tr>
<tr>
<td></td>
<td>A. acromialis</td>
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</table>
TABLE 2 (contd.)

TERMS USED BY KAUPP (19) DOMESTIC FOWL

<table>
<thead>
<tr>
<th>A. thoracica</th>
<th>Recurrent esophageal arteries</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. thoracica interna S. A. mammarica interna</td>
<td>Recurrent intestinal artery</td>
</tr>
<tr>
<td>Inner branch</td>
<td>Recurrent iliocolicus</td>
</tr>
<tr>
<td>Outer branch</td>
<td>Posterior or recurrent sinister</td>
</tr>
<tr>
<td>A. thoracica externa S. R. superior</td>
<td>Anterior or recurrent dexter</td>
</tr>
<tr>
<td>A. thoracica inferior S. R. inferior</td>
<td>A. hepatica dextra</td>
</tr>
<tr>
<td>A. thoracica longa S. A. subcutanea thoracica</td>
<td>Hepatic artery</td>
</tr>
<tr>
<td>A. axillaris</td>
<td>Gastric artery</td>
</tr>
<tr>
<td>A. subscapularis</td>
<td>Anterior mesenteric artery</td>
</tr>
<tr>
<td>A. brachialis</td>
<td>Recurrent iliocolicac</td>
</tr>
<tr>
<td>A. circumflexa humeri</td>
<td>Recurrent superior haemorrhoidal</td>
</tr>
<tr>
<td>A. brachialis profunda</td>
<td>Posterior mesenteric artery</td>
</tr>
<tr>
<td>A. circumflexa humeri posterior</td>
<td>median haemorrhoidal</td>
</tr>
<tr>
<td>A. collateralis ulnaris</td>
<td>Crural artery (External iliac)</td>
</tr>
<tr>
<td>A. collateralis radialis</td>
<td>Internal pelvic (umbilical)</td>
</tr>
<tr>
<td>A. radialis</td>
<td>In female a branch for the oviduct</td>
</tr>
<tr>
<td>A branch to the carpus</td>
<td>Circumflex femoris</td>
</tr>
<tr>
<td>A. recurrens radialis</td>
<td>Femoralis</td>
</tr>
<tr>
<td>A. ulnaris</td>
<td>A. ischiadica</td>
</tr>
<tr>
<td>A. recurrens ulnaris</td>
<td>A. recurrens renalis</td>
</tr>
<tr>
<td>A branch to the wing plexus</td>
<td>In female A. ovarialis</td>
</tr>
<tr>
<td>A branch for the thumb</td>
<td>A. tibialis postica</td>
</tr>
<tr>
<td>A branch for the phalanges</td>
<td>A. tibialis antica</td>
</tr>
<tr>
<td>Esophageal arteries</td>
<td>Peroneal artery</td>
</tr>
<tr>
<td>Intercostal arteries</td>
<td>Anterior tibial plexus</td>
</tr>
<tr>
<td>Lumbar arteries</td>
<td>A. pudenda communis</td>
</tr>
<tr>
<td>Spermatic arteries; paired in male and unpaired in female</td>
<td>A. renalis</td>
</tr>
<tr>
<td>Renal arteries</td>
<td>A. haemorrhoidalis intima</td>
</tr>
<tr>
<td>Celiac axis</td>
<td>A. pudenda externa</td>
</tr>
<tr>
<td></td>
<td>A. sacralis media</td>
</tr>
<tr>
<td></td>
<td>median coccygeal artery</td>
</tr>
<tr>
<td></td>
<td>Aa. coccygeae laterales</td>
</tr>
</tbody>
</table>
Martin wrote in Lehrbuch der Anatomie der Haustiere (22) in 1923 concerning the arterial system of the bird. His account of the arteries was not detailed, dealing only with the large trunks. He did not give illustrations to support his descriptions, and used Latin terms which are compiled in Table 3.

**TABLE 3**

<table>
<thead>
<tr>
<th>TERMS USED BY MARTIN (22)</th>
<th>BIRD IN GENERAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aorta</td>
<td>A. coeliaca</td>
</tr>
<tr>
<td>A. brachiocephalica sinistra</td>
<td>A. mesenterica cranialis</td>
</tr>
<tr>
<td>et dextra</td>
<td>A. mesenterica caudalis</td>
</tr>
<tr>
<td>A. carotis communis</td>
<td>Aa. renalis</td>
</tr>
<tr>
<td>A. vertebralis</td>
<td>Aa. intercostales</td>
</tr>
<tr>
<td>A. subclavia</td>
<td>Aa. lumbales</td>
</tr>
<tr>
<td>A. sternoclavicularis</td>
<td>A. spermatica</td>
</tr>
<tr>
<td>A. axillaris</td>
<td>A. iliaca externa</td>
</tr>
<tr>
<td>A. thoracica cranialis</td>
<td>A. ischiadica</td>
</tr>
<tr>
<td>A. thoracica interna</td>
<td>A. tibialis anterior</td>
</tr>
<tr>
<td>A. thoracica externa S. caudalis</td>
<td>A. poplitea</td>
</tr>
<tr>
<td>Plexus incubatoris</td>
<td>A. sacralis media</td>
</tr>
</tbody>
</table>

Otte, in 1928, in his text Die Krankheiten des Geflügel mit Berücksichtigung der Anatomie und der Hygiene (31), discussed the arterial system of fowl. His account of the arteries was more brief than that of the Kaupp (19), and nomenclatural differences were evident. The terms used in the description of the arteries are presented in Table 4.
<table>
<thead>
<tr>
<th>Term Used by Otte (31) Fowl</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Aorta</strong></td>
</tr>
<tr>
<td>A. coronaria cordis, sinistra and dextra</td>
</tr>
<tr>
<td><strong>Branch of aorta</strong></td>
</tr>
<tr>
<td>A. carotis</td>
</tr>
<tr>
<td>A. bronchialis</td>
</tr>
<tr>
<td>A. cutanea anterior</td>
</tr>
<tr>
<td>A. pharyngea ascendens</td>
</tr>
<tr>
<td>A. ascendens colli</td>
</tr>
<tr>
<td>A. vertebralis</td>
</tr>
<tr>
<td>Ascending branch</td>
</tr>
<tr>
<td>Descending branch</td>
</tr>
<tr>
<td>A. cervicalis descendens</td>
</tr>
<tr>
<td>A. carotis interna S. cerebralis</td>
</tr>
<tr>
<td>A. occipitalis</td>
</tr>
<tr>
<td>R. ophthalmicus</td>
</tr>
<tr>
<td>R. cerebralis</td>
</tr>
<tr>
<td>A. carotis externa S. facialis</td>
</tr>
<tr>
<td>A. hyoidea</td>
</tr>
<tr>
<td>A. laryngea</td>
</tr>
<tr>
<td>A. lingualis</td>
</tr>
<tr>
<td>A. facialis</td>
</tr>
<tr>
<td>A. auricularis</td>
</tr>
<tr>
<td>A. facialis externa</td>
</tr>
<tr>
<td>A. facialis interna</td>
</tr>
<tr>
<td>A. maxillaris interna</td>
</tr>
<tr>
<td>A. subclavia</td>
</tr>
<tr>
<td>A. mammaria interna</td>
</tr>
<tr>
<td>A. mammaria externa</td>
</tr>
<tr>
<td>A. axillaris</td>
</tr>
<tr>
<td>A. subscapularis</td>
</tr>
<tr>
<td>A. brachialis</td>
</tr>
<tr>
<td>A. radialis</td>
</tr>
<tr>
<td>A. interossea</td>
</tr>
<tr>
<td>A. ulnaris</td>
</tr>
<tr>
<td>A. collateralis ulnaris</td>
</tr>
<tr>
<td>Aa. intercostales posteriores</td>
</tr>
<tr>
<td>A. coeliaca</td>
</tr>
<tr>
<td>A. mesenterica anterior</td>
</tr>
<tr>
<td>A. spermatica</td>
</tr>
<tr>
<td>A. cruralis</td>
</tr>
<tr>
<td>A. pelvica interna S. umbilicalis</td>
</tr>
<tr>
<td>A. circumflexa femoris</td>
</tr>
<tr>
<td>A. femoris</td>
</tr>
<tr>
<td>A. ischiadica</td>
</tr>
<tr>
<td>A. glutea</td>
</tr>
<tr>
<td>A. tibialis postica</td>
</tr>
<tr>
<td>A. tibialis antica</td>
</tr>
<tr>
<td>A. mesenterica posterior</td>
</tr>
<tr>
<td>A. pudenda communis S. A. hypogastrica</td>
</tr>
<tr>
<td>A. renalis posterior</td>
</tr>
<tr>
<td>A. haemorrhoidalis infima</td>
</tr>
<tr>
<td>A. profunda penis</td>
</tr>
<tr>
<td>A. coccygea media</td>
</tr>
<tr>
<td>A. coccygea laterales</td>
</tr>
</tbody>
</table>
Grzimek (18) in 1933 investigated the arteries of the head and neck, thoracic and hind limbs of the chicken. His description of the arteries was limited, and the relationships of the arteries with other anatomical structures were ignored. He used Latin terminology which is compiled in Table 5.

In 1941 Mauger (23) particularly discussed the branches of the abdominal aorta in the domestic fowl, and established their correlation with the abdominal plexuses of the sympathetic nervous system. He used the anglicized nomenclature and described the following arteries in the cockrel:

1. Intercostal
2. Coeliac
3. Anterior mesenteric
4. Renal
5. Spermatic
6. Femoral
7. Sciatic
8. Posterior mesenteric
9. Internal iliac
10. Lumbar

He also reported that the ovary of the hen receives its blood supply from the ovarian artery and a branch of the left renal artery. The oviduct receives blood from the left renal artery or left femoral artery, left sciatic artery and the left internal iliac artery. His
TABLE 5

TERMS USED BY GRZIMEK (18) CHICKEN

<table>
<thead>
<tr>
<th>Aorta</th>
<th>A. brachialis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Truncus brachiocephalicus communis</td>
<td>A. profunda brachii</td>
</tr>
<tr>
<td>A. brachiocephalica dexter et sinister</td>
<td>A. humeralis</td>
</tr>
<tr>
<td>A. carotis communis</td>
<td>A. collateralis ulnaris</td>
</tr>
<tr>
<td>A. vertebrais</td>
<td>A. circumflexa humeri posterior</td>
</tr>
<tr>
<td>A. comes vagi</td>
<td>A. collateralis radialis</td>
</tr>
<tr>
<td>A. carotis interna</td>
<td>A. circumflexa humeri anterior</td>
</tr>
<tr>
<td>A. ophthalmica</td>
<td>A. radialis</td>
</tr>
<tr>
<td>A. cerebrales</td>
<td>A. ulnaris</td>
</tr>
<tr>
<td>A. carotis externa</td>
<td>A. indicis</td>
</tr>
<tr>
<td>A. occipitalis</td>
<td></td>
</tr>
<tr>
<td>R. occipitalis</td>
<td></td>
</tr>
<tr>
<td>R. descendens</td>
<td></td>
</tr>
<tr>
<td>A. lingualis</td>
<td></td>
</tr>
<tr>
<td>A. palatina</td>
<td></td>
</tr>
<tr>
<td>A. subclavia</td>
<td></td>
</tr>
<tr>
<td>A. sternoclavicularis</td>
<td></td>
</tr>
<tr>
<td>A. acromialis</td>
<td></td>
</tr>
<tr>
<td>A. sternalis</td>
<td></td>
</tr>
<tr>
<td>A. clavicularis</td>
<td></td>
</tr>
<tr>
<td>A. thoracica</td>
<td></td>
</tr>
<tr>
<td>A. thoracica interna</td>
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<tr>
<td>R. ventralis</td>
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<tr>
<td>R. dorsalis</td>
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<tr>
<td>A. thoracica externa</td>
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<td>A. thoracica ext. dorsalis</td>
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</tr>
<tr>
<td>A. thoracica ext. ventralis</td>
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<tr>
<td>A. axillaris</td>
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</tr>
<tr>
<td>A. subscapularis</td>
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</tr>
<tr>
<td>A. coracoidalis</td>
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</tr>
<tr>
<td>A. humeralis</td>
<td></td>
</tr>
<tr>
<td>A. collateralis ulnaris</td>
<td></td>
</tr>
<tr>
<td>A. circumflexa humeri posterior</td>
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</tr>
<tr>
<td>A. collateralis radialis</td>
<td></td>
</tr>
<tr>
<td>A. circumflexa humeri anterior</td>
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</tr>
<tr>
<td>A. radialis</td>
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</tr>
<tr>
<td>A. ulnaris</td>
<td></td>
</tr>
<tr>
<td>A. indicis</td>
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</tr>
<tr>
<td>A. iliaca externa</td>
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</tr>
<tr>
<td>A. pelvica interna</td>
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</tr>
<tr>
<td>A. circumflexa femoris</td>
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</tr>
<tr>
<td>A. femoris</td>
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</tr>
<tr>
<td>A. genu Supreme</td>
<td></td>
</tr>
<tr>
<td>A. ischiadica externa</td>
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<td>A. glutaea</td>
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<td>A. trochanterica</td>
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<td>A. femoris caudalis</td>
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<tr>
<td>A. poplitea</td>
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account of the abdominal arteries was more brief than that of the Kaupp (19), excepting a few omissions and additions, did not materially vary from Kaupp's description. Nomenclatural differences were marked.

In 1941 Sápy (35) considered the arterial system of the domestic bird. His description covered the main vessels, and several illustrations of the arteries were presented. It was, however, Sápy who first mentioned that the arteriae intercostales suprema arise from the arteria vertebralis. He used Latin terminology which is compiled in Table 6.

Ellenberger and Baum in the twelfth edition of Handbuch der Vergleichenden Anatomie der Haustiere (9) described the main arteries of the bird. Their description was very brief. The fourteenth edition of Handbuch der Vergleichenden Anatomie der Haustiere (10) was published in 1915. The account was unchanged from the authors' earlier effort. In 1943 there appeared the eighteenth edition of the Handbuch der Vergleichenden Anatomie der Haustiere (11) revised by Zeitzschmann, Acherknecht and Grau. It was here that the authors discussed the arteries of the head and neck, thoracic limb and the pelvic limb. Their presentation of the arteries was essentially a condensation of Grzimek's work (18) from which several of the accompanying figures were taken.

Glenny (17) reported the main arteries in the region of the heart in the European mute swan, lesser Canada goose, Egyptian goose, snow goose, white fronted goose, coscorba duck, American scoter, surf scoter, great squaw duck, old squaw duck, American golden eye, buffle head duck, red breasted merganser and American merganser. His description of the
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arteries was very brief. He presented three illustrations, two of which were taken from Finn's work (13) and Bhaduri's work (5). He used anglicized nomenclature.

Sperber (36) in 1948 investigated the circulatory system of the avian kidney, and reported that there are three pairs of arteries, each of which supplies a lobe of the kidney. The anterior renal artery supplies the cranial lobe, and the femoral artery sends branches to the middle and caudal lobes of the kidney. The third artery, the ischiadic, courses between the borders of the middle and caudal lobes, and ramifies mainly in the latter.

In 1949 Nalbandov and James (25) reported on the blood vascular supply to the chicken's ovary. They were of the opinion that the ovary receives its blood supply from the short ovarian artery, which usually arises from the left renolumbar artery, but may branch directly from the dorsal aorta.

Worden (38) in 1956 presented a very superficial account of the arterial system of the bird. He used the anglicized nomenclature which is compiled in Table 7.

In 1957, Bhaduri, et al. (5) reported the arterial system of the domestic pigeon. Their description was confined to the main arteries, and lacked the topographic approach. They used anglicized nomenclature which is tabulated in Table 8.
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<th>Brachial artery</th>
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<td>Iliac artery</td>
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<td>Caudal artery</td>
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Lorenz in 1959 (21) discussed the gonadal arteries of the male domestic fowl. He reported that the testis is supplied by a short testicular artery which originates directly from the dorsal aorta.

One year later there appeared the fourth edition of Bradley's, *The Structure of the Fowl* (6) revised by Tom Grahame. The account of the arterial system was brief and lacked topographic details. His description covered the main arteries but the finer details of their ramification were not described. Anglicized terminology was used to designate the arteries.

Nashida (26) in 1960 investigated the arteries of the thoracic limb of the fowl. He reported that the arteria subclavia was the chief artery of the thoracic limb, and there are branches from the arteria vertebralis, arteria comes nervi vagi and the arteria intercostalis which also supply the proximal portion of the thoracic limb. He used Japanese and Latin terms, the latter follows Kaupp's nomenclature.

In 1961 Evans (12) presented a brief description of the arteries and only the important branches of the main vessels were mentioned. He used anglicized nomenclature.

Kioht (20) in 1962 reported on the arteries of the brain in the fowl. His account of the arteries, excepting for a few omissions and additions, was essentially the same as that of the Gadow and Salenka (16). He used Japanese and Latin terms, the latter did not materially vary from the terms used by Gadow and Salenka.

Ball, Sautter and Katter (3) in 1963 reported the morphological characteristics of the anterior mesenteric artery of the fowl, and were
of the opinion that the pattern of gross distribution of the branches of the abdominal aorta in the turkey is practically the same as that of the chicken.

Freedman and Sturkie (15) discussed the blood vessels of the chicken uterus (shell gland). They reported that the blood is supplied to the uterus by three arteries. The hypogastric artery, a branch of the left sciatic artery, carries blood to the anterior portion of the uterus, and bifurcates into the anterior and posterior uterine arteries. The lateral and inferior uterine arteries originate from the anterior uterine artery.

Nashida (27) investigated the arteries of the hind limb of the fowl. He enlarged upon the work of Grzimek (18) but his description excepting for a few omissions and additions did not materially vary from that of Grzimek. He used Japanese and Latin terminology, the latter was adopted from Grzimek (18) and Kaupp (19).

Callegari and Veggetti (7) in 1964 reported on the arterial system of the viscera of fowl. Their description of the arteries was brief, superficial, lacked the topographic approach, and was not supported by illustrations. They used a mixture of Latin and Italian nomenclature which is given in Table 9.

Mcleod, Trotter and Lumb in 1964 in their text, Avian Anatomy (24) discussed the vascular system of the bird. This account of the arterial vessels was limited, dealing only with the large trunks, and anglicized terms were used.
### TABLE 9

**TERMS USED BY CALLEGARI AND VEGGETTI (7)**

<table>
<thead>
<tr>
<th>English Term</th>
<th>Italian Term</th>
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<tbody>
<tr>
<td>Posterior aorta</td>
<td>Aorta posteriore</td>
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<tr>
<td>Aa. intercostali e vertebrali (last 3 pairs)</td>
<td>Aa. intercostali e vertebrali (ultime 3 paia)</td>
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<tr>
<td>Aa. vertebrali lumboscrali</td>
<td>Aa. vertebrali lumboscrali</td>
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<tr>
<td>A. celiaca</td>
<td>A. celiaca</td>
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<tr>
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<td>A. gastro-esophagea</td>
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<td>A. esophagea ascendente</td>
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<td>A. gastrica dorsales</td>
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<td>A. gastrica sinistra</td>
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<td>Ramo esofageo</td>
<td>Ramo esofageo</td>
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<tr>
<td>A. epato-gastro-duodenale</td>
<td>A. epato-gastro-duodenale</td>
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<tr>
<td>A. epatica sinistra</td>
<td>A. epatica sinistra</td>
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<td>A. lienale superiore</td>
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<td>A. epatica destra</td>
<td>A. epatica destra</td>
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<td>Aa. lienali inferiori</td>
<td>Aa. lienali inferiori</td>
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<td>A. pancreatico-duodenale</td>
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<td>A. gastrica destra</td>
<td>A. gastrica destra</td>
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<td>Aa. ileo-ciecali</td>
<td>Aa. ileo-ciecali</td>
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<td>Rami pancreatici e duodenali</td>
<td>Rami pancreatici e duodenali</td>
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<td>A. mesenterica anteriore</td>
<td>A. mesenterica anteriore</td>
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<td>Aa. intestinali</td>
<td>Aa. intestinali</td>
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<tr>
<td>Ramo ascendente e discendente</td>
<td>Ramo ascendente e discendente</td>
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<tr>
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<td>A. ilio-ciecale</td>
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<td>A. testicolare anteriore in male</td>
<td>A. testicolare anteriore in male</td>
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<tr>
<td>A. renale anteriore destra in female</td>
<td>A. renale anteriore destra in female</td>
</tr>
</tbody>
</table>

A. gonado-renale
- A. testiculares posteriores
- In
- A. renalis anteriore
- Male
- A. renalis anteriore sinistra
- In
- Aa. ovariche
- Female

A. iliaca esterna
- A. pelvica
- A. anteriore dell'ovidotto in female
- A. circonflessa del femore
- A. femorale

A. ischiatica
- A. renale media
- A. renale posteriore
- A. posteriore dell'ovidotto

A. sacrale media
- Aa. vertebrali
- A. mesenterica caudale
- Ramo anterior O Colico
- Ramo posteriore
- A. iliaca interna
- Ramo anteriore
- Ramo posteriore
- A. coccygea mediana
- Aa. vertebrali
Nashida (28) in 1964 gave an extensive account of the blood vascular system of the male reproductive organs of the fowl. He reported that the testis is supplied by the arteria testicularis which originated from the abdominal aorta by a common trunk with the arteria renalis anterior, and the arteria testicularis accessorius which arises independently from the abdominal aorta. The latter vessel is inconsistent. The epididymis is supplied by the arteria epididymicae which is a branch of the arteria renalis anteriore, the arteriae ureto-deferentiales mediae which are branches of the arteria renalis posteriore, and the arteriae ureto-deferentiales posteriores which are branches of the arteria pudenda interna. He further said that the vascular body and the rudimentary copulatory organ are supplied by the arteria pudenda interna and by a cloacal branch of the arteria pudenda externa.
MATERIALS AND METHODS

The distribution of the arteries were determined in three pairs of turkeys (Meleagris gallopavo), three pairs of chickens (Gallus domesticus), three pairs of geese (Anser anser) and three pairs of ducks (Anas platyrhynchos). Half of the birds were adult males and half of them were adult females. Each bird was anesthetized by intravenous injection of an adequate amount of sodium pentobarbital solution. After exposing the common carotid artery, a cannula made from an eighteen-gauge needle was inserted centrally and the bird was permitted to exsanguinate by means of its own heart action. The preserving fluid containing the following percentage of chemical was injected by means of a 50 c.c. disposable syringe through the cannula inserted in the common carotid artery:

<table>
<thead>
<tr>
<th>Preserving Fluid</th>
<th>percent</th>
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<tr>
<td>Formalin</td>
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<td>Phenol</td>
<td>2.50</td>
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<td>Glycerine</td>
<td>2.50</td>
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<td>Distilled water</td>
<td>86.25</td>
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The specimens, thus preserved, were then placed in a cold room of 4 degrees centigrade temperature for two days. The birds were divided
into two groups. One pair of each species of the birds were injected with the red latex injection compound.\(^1\) The remainder of the birds were injected with the following emulsion:

- 8 percent aqueous solution of powder gelatin 2-1/2 parts
- Lead oxide (Red reagent) - - - - - - - 1 part

This emulsion solidifies in the arteries and gives an orange to red color to the arteries. The birds injected with the emulsion were studied by arteriography and gross dissection; those injected with red latex injection compound were studied by gross dissection only, with or without the help of a dissecting microscope.

Nomenclature

One of the major problems which has presented itself is the matter of avian anatomical terminology. In old literature, and, in fact that of recent date, the terminology of the avian arteries used by different authors is confusing. The Nomina Anatomica Veterinaria of 1923 (30) is not authoritative today and is being extensively revised. The subcommittee on the nomenclature of avian anatomy has not published the list of terms as yet; so many of the terms employed here may have a temporary existence. The nomenclature of the arteries of the head and neck, thoracic limb and the pelvic limb employed in this text follows closely the work of Grzimek (18), and the terms used to designate the branching of the descending aorta follow the work of

\(^1\)Latex Injection Compound, General Biological Supply House, Chicago, Illinois.
Sápy (35) and Nashida (28). The nomenclature of the avian myology has been taken from the work of Chamberlain (8). Many modifications, substitutions, additions and omissions are introduced to make the terms more descriptive and, chiefly, in order to conform to the Nomina Anatomica (29).
RESULTS

The Arteries of the Male Turkey (Meleagris gallopavo)

Aorta

Aorta ascendens

Arcus aortae

Aorta descendens

The aorta (Fig. 1, Aa) is the main trunk of the general arterial system. It leaves the left ventricle and proceeds cranially and slightly to the right inclining somewhat dorsally. Its root is bounded by the right auricle on the right side, by the left auricle on the left side, cranially by the root of the pulmonary arteries and caudally by the auricles. For purposes of description the aorta may be divided into the aorta ascendens, arcus aortae and the aorta descendens.

Aorta ascendens

A. coronaria dextra

R. superficialis dextra

Small A-V septal branch

Large branch

Atrial branch

Valvular branch

Ventricular branch

27
Atrial terminal branch
Ventricular terminal branch
R. profunda dextra
Septal branches
Valvular branches
R. proximalis
R. perforans
Ventricular terminal branches
R. distalis
A. coronaria sinistra
R. superficialis sinistra
Atrial branches
Ventricular branches
Rami profunda sinistra
Septal branches
Ventricular branches
A. interatrialis

The ascending aorta (Fig. 1, Aa), about 1 cm in length, lies in the middle mediastinum. It arises from the base of the left ventricle, passes cranially and slightly to the right, and becomes the arch of the aorta. Its diameter of 0.7 cm is not uniform, for at its root there are three bulgings in its wall each opposite one cusp of the aortic valve. The bulgings are called the aortic sinuses. The ascending aorta is enveloped, together with the pulmonary arteries, in a tube of visceral serous pericardium. The ligamentum arteriosum is a constant feature
Fig. 1.-- The branches of the arcus aortae. Ventral View.  
Aac, A. acromialis; Atev, A. thoracica externa ventralis; Ati, A. thoracica interna; H, Heart; Li, Liver; g, gall bladder; D, Duodenum; P, Pancreas; G, Gizzard; L, Lung; Aa, Ascending aorta; Att, A. thyrotrachealis; B, truncus brachiocephalicus sinistra; Asc, A. sternoclavicularis; rd, ramus dorsalis; rv, ramus ventralis; Atelc, A. thoracica externa lateralis caudalis; Ateclr, A. thoracica externa lateralis cranialis; Ate, A. thoracica externa lateralis; Ated, A. thoracica externa dorsalis; Atc, A. thoracica communis; Aax, A. axillaris; As, A. subclavia; Acc, A. carotis communis.

Fig. 2.-- Schematic illustration of the topographic anatomy of the viscera. Ventral View. T, Trachea; Aa, Arcus aortae; H, Heart; Li, Liver; G, Gall bladder; I, Small intestines; C, Cecum; D, Duodenum; P, Pancreas; R, Rectum; Cl, Cloaca; Gi, Gizzard; S, Skin.
and is a weak fibrous band connecting the aorta and the right pulmonary artery. The ascending aorta gives off the arteria coronaria dextra and the arteria coronaria sinistra at the level of its root.

Arteria Coronaria Dextra

This vessel arises from the right (ventral) sinus aortae and is 0.5 cm in length. It divides into the ramus superficialis dextra and the ramus profunda dextra.

Ramus Superficialis Dextra

This ramus proceeds craniocaudally between the right auricle and the conus arteriosus. At the level of the coronary sulcus it bifurcates into a smaller branch and a larger branch. The smaller branch supplies the right ventricular wall and the conus arteriosus. The larger branch is the continuation of the ramus superficialis dextra and takes a flexuous course in the right coronary sulcus towards the upper depression of the right (dorsal) longitudinal sulcus. The latter gives off branches to the atrium, the right A-V valve and the right ventricle.

The atrial branches leave the ramus superficialis dextra and enter the atrial wall. Here they divide into the ascending and the descending vessel. The ascending vessels are larger than the descending vessels and supply musculi pectinati. They anastomose with the branches of the interatrial artery and ramus superficialis sinistra. The descending vessels supply the A-V junction.

The valvular branches are numerous and run distally into the single muscular cusp of the right atrioventricular valve.
The ventricular branches run ventrally parallel to the long axis of the heart and supply the ventral wall of the right ventricle.

The main trunk of the ramus superficialis usually terminates by bifurcating into the atrial and the ventricular branches. The terminal atrial branch may anastomose with the left superficial ramus (intercoronary anastomosis), and the terminal ventricular branch anastomoses with another branch of the ramus profunda dextra (homocoronary anastomosis).

Ramus Profunda Dextra

This vessel is larger than the ramus superficialis dextra. It proceeds in a curve onto the right ventral face of the I-V septum and comes to lie in a subendocardial position in a furrow at the junction of the I-V septum and the aorta. It gives off branches to the I-V septum and the right A-V muscular cusp. The septal branches anastomose freely with the septal branches of the ramus profunda sinistra. The valvular branches run parallel to the long axis of the cusp and enter near its free margin. At the level of the junction of the I-V septum and the aorta it bifurcates into the ramus proximalis and the ramus distalis.

Ramus Proximalis

This ramus curves dorsally on the right upper third of the I-V septum and bifurcates distal to the septal attachment of the A-V cusp. It gives off the ramus perforans, which penetrates the wall of the left ventricle posterior to the right longitudinal sulcus and supplies the dorsal wall of both atria and the right A-V valve. This vessel divides into several branches, one of which anastomoses with the ramus
superficialis sinistra (intercoronary anastomosis), while another anastomoses with a branch of the ramus superficialis dextra (homocoronary anastomosis). The terminal two branches of the ramus proximalis pass deeply into the dorsal wall of the left ventricle but do not reach the apex of the heart.

Ramus Distalis

This vessel runs toward the apex of the heart on the right ventral face of the I-V septum. It supplies a large part of the right ventricular wall, including the apex.

Arteria Coronaria Sinistra

The arteria coronaria sinistra arises from the left sinus aortae. It curves to the left and proceeds ventrally to arrive at the upper border of the left ventricle. Slightly to the left of the conus arteriosus it gives off one to three rami profunda, and the main trunk continues as the ramus superficialis sinistra. The main trunk also gives off the interatrial artery very close to its origin.

Ramus Superficialis Sinistra

This vessel is the continuation of the main trunk and courses tortuously in the left coronary sulcus. It bifurcates on the dorsal aspect of the heart into the atrial and ventricular branches; the atrial branches supply the right atrium and the sinus venosus; the ventricular branches pass vertically downward in the subepicardial
tissue onto the upper part of the left ventricular wall and anastomose with the ramus perforans of the arteria coronaria dextra (intercoronary anastomosis). No homocoronary anastomosis was found.

Rami Profunda Sinistra

The vessels are two to three in number and arise from arteria coronaria sinistra just behind the conus arteriosus. These rami turn almost at a right angle, and pass ventrally on the left face of the I-V septum. From this point on they proceed toward the left dorsal ventricular wall. They give off septal branches which anastomose with the septal branches of the arteria coronaria dextra (intercoronary anastomosis). One branch ramifies on or in the adjacent wall of the right ventricle.

Arteria Interatrialis

The interatrial artery arises from the left coronary artery very close to the left sinus aortae and proceeds craniodorsally. It gives off the vasa vasorum to the aorta and the pulmonary vessels, and branches to both atria and the interatrial septum.

Arcus Aortae

The arch of the aorta (Fig. 2, Aa) lies in the cranial mediastinum. The aorta runs craniodorsally and to the right of the first thoracic vertebra, where, turning caudally, it becomes continuous with the descending aorta. At the level of the first thoracic vertebra it gives off the truncus brachiocephalicus sinistra which proceeds cranio-laterally making an angle of 115 to 120 degrees with the ascending aorta.
Fig. 3.-- The branches of the arteria carotis communis. Acc, A. carotis communis; Tb, Truncus brachiocephalicus dextra; Rtr, Ramus trachealis; Att, A. thyrotrachealis; Rt, Ramus thyroideus; Atc, A. thyroidea caudalis; Ater, A. thyroidea cranialis; Aea, A. esophagea ascendens sinistra.

Fig. 4.-- The arteries of the neck. Acnv, A. comes nervi vagi; Al, A. lateralis; Rc, Ramus cutaneus; Av, A. vertebralis communis; Rm. Ramus muscularis; R, Ramus for the thymus.

Fig. 5.-- The branches of the arteria carotis communis at the cranial end of the neck. Ace, A. carotis externa; Acf, A. carotis interna; Asc, A. subcutanea colli; Ao, A. occipitalis; Rs, R. superficialis; Rp, Ramus profunda.

Fig. 6.-- The branches of the arteria carotis externa. Ali, A. lingualis; As, A. sublingualis; Aam, A. alveolaris mandibulae; Am, A. mandibularis; Al, A. laryngea; Aed, A. esophagea descendens; Ace, A. carotis externa; Acc, A. carotis communis; Ao, A. occipitalis; Rs, R. superficialis; Rp, R. profunda; Acf, A. carotis interna; Ama, A. maxillaris; Ap, A. palatina; Af, A. facialis.

Fig. 7.-- The branches of the arteria carotis interna. Aoe, A. ophthalmica externa; Aai, A. alveolaris inferior; Acc, A. carotis cerebralis; Ace, A. carotis externa; Acf, A. carotis interna; As, A. sphenoida; Pt, Plexus temporalis; At, A. temporalis.
It is the first branch from the convexity of the arcus aortae. The main trunk of the aorta proceeds craniodorsally and to the right for a distance of 0.5 cm and gives off the truncus brachiocephalicus dextra which proceeds at first cranially at a right angle to the arch of the aorta for a distance of 0.5 cm, then turns craniolaterally making an angle of 45 degrees with the transverse axis of the body. The roots of the right and left brachiocephalic trunks along with the ascending aorta are ensheathed by the extension of the pericardium and fat. Both of the trunks pass divergently ventral to the corresponding bronchus and dorsal to the M. sternotrachealis in the direction of the shoulder joint. The truncus brachiocephalicus sinistra is given off the arcus aortae 1 cm cranial to the root of the aorta, and the truncus brachiocephalicus dextra takes its origin from the arcus aortae 0.5 cm craniolaterad to the origin of the truncus brachiocephalicus sinistra.

Arcus Aortae

Truncus brachiocephalicus sinistra

A. carotis communis
A. thyrotrachealis
A. subclavia

Truncus brachiocephalicus dextra

A. carotis communis
A. subclavia

The truncus brachiocephalicus sinistra (Fig. 1, B) gives rise to the arteria carotis communis sinistra from its cranial wall 3.5 cm laterad to its origin. At the level of origin of the arteria carotis
communis sinistra it gives rise to a small vessel, the arteria thyrotrachealis sinistra from its ventrocaudal wall. The vessel continues laterally as the arteria subclavia sinistra. The truncus brachiocephalicus dextra (Fig. 3, TB) gives rise to the arteria carotis communis from its cranial wall 2 cm craniolaterad to its origin. The arteria thyrotrachealis dextra does not arise from the right brachiocephalic trunk but instead it takes its origin from the arteria subclavia dextra 0.4 cm laterad to the origin of the arteria carotis communis dextra.

Arteria Carotis Communis

A. carotis communis

A. thyroidea caudalis

A. esophagea ascendens

A. thyroidea cranialis

A. vertebralis communis

A. vertebralis cranialis

R. dorsalis

R. ventralis

A. vertebralis caudalis

Aa. intercostales cranialis

A. comes nervi vagi

A. lateralis

R. muscularis

R. cutaneus

A. subcutanea colli
A. occipitalis
A. carotis externa
A. carotis interna

The arteria carotis communis (Figs. 1, Acc; 3, Acc; 6, Acc) is given off the cranial wall of the truncus brachiocephalicus 3.5 cm laterad to the origin of the latter. It proceeds cranially and gives off the arteria thyroidea caudalis at the level of the thyroid gland and 0.8 cm cranial to its origin. The arteria esophagea ascendens is given off the dorsolateral wall of the arteria carotis communis 1.4 cm cranial to the origin of the latter. The main vessel gives rise to the arteria vertebralis communis 0.4 cm cranial to the origin of the arteria esophagea ascendens. Following the origin of the arteria vertebralis communis, the artery converges toward the midline of the neck and is closely associated with the arteria carotis communis of the other side at the level of the 11th cervical vertebra. Both the arteries run cranially side by side in the m. longus colli up to the fourth cervical vertebra where they start diverging from each other, and emerge completely from the m. longus colli at the level of the axis. During its course in the m. longus colli it gives off the arteria subcutanea colli. The main trunk of the arteria carotis communis divides into the arteria occipitalis, the arteria carotis externa, and the arteria carotis interna at the level of atlas and 1.5 cm cranial to the origin of the arteria subcutanea colli.
Arteria Thyroidea Caudalis

This artery (Fig. 3, Atc) originates from the lateral wall of the arteria carotis communis 0.8 cm cranial to the origin of the latter, and proceeds laterally to enter the thyroid gland.

The course adopted by the arteria esophagea ascendens of the right and left side are different, therefore, the vessels are described separately.

Arteria Esophagea Ascendens Sinistra

The arteria esophagea ascendens sinistra (Fig. 3, Aea) takes its origin from the dorsolateral wall of the arteria carotis communis sinistra 1.4 cm cranial to the origin of the latter. It courses caudally along with the arteria carotis communis and gives rise to the arteria thyroidea cranialis at the level of the thyroid gland. The main stem of the arteria esophagea ascendens crosses the arteria carotis communis to the right and describes an arc at the level of the thyroid gland. Several vessels are given off the arc which course laterally and caudally to supply nutrition to the trachea, esophagus, syrinx, primary bronchi, and lungs. After describing an arc the arteria esophagea ascendens proceeds cranially, crosses the trachea dorsally, and comes to lie between the esophagus and trachea. It supplies branches to the esophagus and trachea. At the level of the ingluvies it gives off three to seven vessels to the ingluvies. The main stem continues ascending between the esophagus and trachea. At the level of the cranial end of the ingluvies it sends a vessel to the trachea which anastomoses with the arteria laryngea on the ventral aspect of the
trachea. The arteria esophagea ascendens divides into finer branches in the cranial one-fourth of the esophagus where they anastomose with the arteria esophagea descendens.

Arteria Thyroidea Cranialis

This artery (Fig. 3, Atcr) is given off the arteria esophagea ascendens slightly cranially to the origin of the arteria thyroidea caudalis. It proceeds laterally to enter the thyroid gland.

Arteria Esophagea Ascendens Dextra

The initial course and distribution of this vessel is the same as that of the arteria esophagea ascendens sinistra. It remains confined to the right side, and can be traced to the cranial border of the ingluvies. The artery supplies the thyroid gland, esophagus and ingluvies. It anastomoses with the branches of the arteria esophagea ascendens sinistra.

Arteria Vertebralis Communis

The arteria vertebralis communis (Fig. 4, Avc) is given off the lateral wall of the arteria carotis communis 1.8 cm cranial to the origin of the latter and at the level of the cranial border of the thyroid gland. It proceeds laterocranially and gives rise to the arteria comes nervi vagi at a distance of 1.2 cm from its origin. The main trunk of the arteria vertebralis communis turns medially and proceeds toward the foramen transversarium at the level of the 12th cervical vertebra. Slightly dorsal to the origin of the arteria comes nervi vagi, the arteria lateralis is given off the dorsolateral wall
of the arteria vertebralis communis. The artery bifurcates on entering the canalis transversarium into the arteria vertebralis cranialis and the arteria vertebralis caudalis.

Arteria Vertebralis Cranialis

This arterial branch proceeds cranially in the canalis transversarium, and gives off dorsal and ventral branches at each intervertebral space. The dorsal branches pass through the foramina transversarium, and supply branches to the dorsal musculature of the neck. The ventral branches also pass through the foramina transversarium, and supply the ventral musculature of the neck. Some of the ventral branches enter the vertebral canal through the intervertebral foramina, and participate in the formation of the arteria spinalis ventralis. At the level of the wing of the atlas it divides into the ramus dorsalis and the ramus ventralis.

Ramus Dorsalis

This arterial branch courses craniolaterally, and supplies nutrition to the m. rectus capitis dorsalis major, m. rectus capitis lateralis, m. semispinalis and m. complexus.

Ramus Ventrailis

The ramus ventralis anastomoses with the ramus profunda of the arteria occipitalis, and supplies nutrition to the m. rectus capitis ventralis.
Arteria Vertebralis Caudalis

The arteria vertebralis caudalis (Fig. 17, Avc) passes caudally through the canalis transversarium, and courses along the first to fourth articulatio costovertebralis. It gives off four arteriae intercostales cranialis.

The arteria intercostalis cranialis prima (Fig. 17, Aicp) takes its origin from the arteria vertebralis caudalis at the level of the first articulatio costovertebralis, and proceeds laterally in the first intercostal space. At the level of the intervertebral foramen it gives rise to a vessel which enters the vertebral canal, and joins the ventral spinal artery. Some of the small vessels, given off in the region of the first articulatio costovertebralis, supply nutrition to the dorsal and ventral musculature of the thoracic vertebrae. The main trunk of the arteria intercostalis cranialis prima divides into finer branches and supply the intercostal muscles. Its branches anastomose with the branches of the arteria intercostalis cranialis secunda.

The arteria intercostalis cranialis secunda (Fig. 17, Aics) and the arteria intercostalis cranialis tercia (Fig. 17, Aict) are given off the arteria vertebralis caudalis, the former at the level of the caudal border of the second rib, and the latter at the level of the cranial border of the third rib. Both the arteries proceed laterally in the second intercostal space, and give off small branches at the level of the second and third articulatio costovertebralis for the dorsal and ventral musculature of the thoracic vertebrae. Some of the branches enter the intervertebral foramina, and contribute to the
formation of the ventral spinal artery. The two arteries anastomose with each other in the second intercostal space.

The arteria intercostalis cranialis quarta (Fig. 17, Aicq) originates from the arteria vertebralis caudalis at the level of the third articulatio costovertebralis, and proceeds laterally along the caudal border of the third rib. It gives off small branches at the level of the third thoracic vertebra which supply the dorsal and the ventral musculature of the thoracic vertebrae. At the level of the intervertebral foramen, a small branch enters the vertebral canal which contributes to the formation of the arteria spinalis ventralis. The main trunk divides into finer branches in the third intercostal space and anastomoses with the arteria intercostalis cranialis tertia and the arteria intercostalis caudalis prima. Anastomosis may also be found between its branches and the branches of the arteria thoracica interna.

Arteria Comes Nervi Vagi

The artery (Fig. 4, Acnv) is given off the arteria vertebralis communis 1.2 cm cranial to the origin of the latter. It proceeds cranially along the lateral aspect of the neck and along the medial aspect of the thymus, and supplies branches to the latter, cutaneous muscles of the neck, fascia and skin of this region. Some of the cutaneous branches anastomose with the ramus superficialis of the arteria occipitalis.
Arteria Lateralis

This arterial branch (Fig. 4, Al) arises from the arteria vertebralis communis slightly craniad to the origin of the arteria comes nervi vagi. It ascends cranially on the medial aspect of the thymus for a distance of 1.5 cm where it divides into the ramus muscularis, a vessel for the thymus and the ramus cutaneus.

The ramus muscularis (Fig. 4, Rm) proceeds laterally toward the shoulder joint, and supplies nutrition to its musculature.

The vessel supplying the thymus (Fig. 4, Rt) courses cranially on the medial aspect of the organ, and supplies it.

The ramus cutaneus (Fig. 4, Rc) proceeds laterally and dorsally to supply the cutaneous muscles, fascia and the skin in the region of the base of the neck.

Arteria Subcutanea Colli

The artery (Fig. 5, Asc) is given off the lateral wall of the arteria carotis communis at the level of the axis. It proceeds laterally, and soon divides into the ramus cranialis and the ramus caudalis. The ramus cranialis ramifies in the m. rectus capitis lateralis, m. rectus capitis ventralis major, m. semispinalis and the m. longus colli, and anastomoses with a branch of the arteria occipitalis. The ramus caudalis supplies the m. ypsilotrachealis and m. sternothyrohyoideus, and anastomoses with a branch of the arteria comes nervi vagi.
Arteria Occipitalis

The arteria occipitalis (Figs. 5, Ao; 6, Ao) is given off the ventrolateral wall of the arteria carotis communis at the level of the atlas. It proceeds laterally and immediately divides into the ramus superficialis and the ramus profunda.

Ramus Superficialis

This arterial branch (Figs. 5, Rs; 6, Rs) extends laterally under the skin, and divides into a cranial and a caudal branch. The cranial branch ascends cranially under the skin, and supplies branches to the skin of the cranium caudal to the comb, m. rectus capitis dorsalis, m. obliquus capitis cranialis and m. splenius. The caudal branch proceeds caudally under the skin, to supply cutaneous branches to the skin and fascia of the neck, and anastomoses with the cutaneous branch of the arteria comes nervi vagi and the ramus cutaneus of the arteria subcutanea colli.

Ramus Profunda

The ramus profunda (Fig. 5, Rp; 6, Rp) originates from the arteria occipitalis, and immediately enters the musculature of the lateral aspect of the neck. It describes an arc and anastomoses with the arteria vertebralis cranialis at the level of the atlas.

Arteria Carotis Externa

A. carotis externa

R. occipitalis

A. esophagea descendens
A. sublingualis
A. hyoidea
R. laryngeus
A. laryngea
A. lingualis
A. mandibularis
A. alveolaris mandibulae
A. palatina
A. maxillaris
A. auricularis
A. pterygoidea
A. facialis

The arteria carotis externa (Figs. 5, Ace; 6, Ace; 7, Ace) arises from the arteria carotis communis immediately following the origin of the arteria occipitalis. It proceeds laterally, and near its origin gives rise to the ramus occipitalis. The arteria esophagea descendens is given off the ventrolateral wall of the arteria carotis externa 0.5 cm laterad to the origin of the ramus occipitalis. The main trunk continues on the medial aspect of the mandible, and divides into the arteria mandibularis, arteria palatina and the arteria maxillaris 0.4 cm rostrad to the origin of the arteria esophagea descendens.

Ramus Occipitalis

The artery is given off the ventrolateral wall of the arteria carotis externa close to the origin of the latter, and lies on the medial aspect of the m. occipitomandibularis. The artery supplies the m. occipitomandibularis and the m. hyomandibularis.
Arteria Esophagea Descendens

This arterial branch (Fig. 6, Aed) originates from the ventrolateral wall of the arteria carotis externa 0.5 cm laterad to the origin of the latter. The artery courses ventrolaterally for a distance of 0.4 cm, and gives rise to the arteria sublingualis. The main stem of the arteria esophagea descendens courses on the lateral aspect of the esophagus, and continues caudally in the fascia between the trachea and the esophagus. It supplies branches to the m. ypsilotrachealis, the trachea and the esophagus. Its esophageal branches anastomose with the esophageal branches of the arteria esophagea ascendens, and its tracheal branches anastomose with the tracheal branches of the arteria esophagea ascendens and with the branches of the arteria laryngea.

Arteria Sublingualis

The arteria sublingualis (Fig. 6, As) arises from the arteria esophagea descendens, and proceeds rostrally between the hyoid bone and the salivary glands. It gives rise to the arteria hyoidea and the ramus laryngeus close to its origin. At the level of the hyoid bone, the arteria lingualis is given off the main stem of the arteria sublingualis. Two centimeters rostrad to its origin it gives rise to the arteria laryngea. The vessel supplies branches to the salivary glands, m. mylohyoideus, m. hyomandibularis, and m. quadratopalatinus. It may anastomose with the arteria alveolaris mandibulae.

Arteria Hyoidea

Immediately following its origin from the arteria sublingualis this arterial branch enters the musculature of the hyoid bone.
Ramus Laryngeus

The ramus laryngeus is given off the arteria sublingualis close to the origin of the latter, and supplies branches to the larynx.

Arteria Laryngea

The artery (Fig. 6, Al) originates from the arteria sublingualis 2 cm rostrad to the origin of the latter, and proceeds caudally on the ventrolateral aspect of the larynx and trachea. It anastomoses with the tracheal branches of the arteria esophagea descendens, and supplies the larynx, pharynx and the cranial portion of the trachea.

Arteria Lingualis

The arteria lingualis (Fig. 6, Ali) arises from the arteria sublingualis at the level of the hyoid bone, and supplies the m. styloentoglossum, m. copuloentoglossum, and m. thyroentoglossum.

Arteria Mandibularis

This arterial branch (Fig. 6, Am) takes its origin from the arteria carotis communis 1 cm rostrad to the origin of the latter, and proceeds rostrally between the m. hyomandibularis and the pharynx. It courses under the m. mandibulomaxillaris and m. pterygoquadromaxillaris, and 1.5 cm rostrad to its origin it gives rise to the arteria alveolaris mandibulae. It supplies branches to the m. mandibulomaxillaris, m. mandibulopalatinus, m. pterygoquadromaxillaris, m. pterygopalatinus and m. quadratopalatinus.
Arteria Alveolaris Mandibulae

The artery (Fig. 6, Aam) arises from the arteria mandibularis, and immediately enters the m. mylohyoideus. It anastomoses with a branch of the arteria sublingualis to form the arteria mentalis, and supplies the intermaxilllary musculature, salivary glands and oral mucosa.

Arteria Palatina

The artery (Fig. 6, Ap) takes its origin from the arteria carotis externa at the level of origin of the arteria mandibularis. It courses on the inner aspect of the m. masseter, and enters the beak at the rostral end of the nasal fissure. It gives off branches to the nasal mucosa, and anastomoses with the arteria ethmoidea. The vessel may be traced in the beak where it gives off small branches to the nasal bone and the beak.

Arteria Maxillaris

The arteria maxillaris (Fig. 6, Ama) originates from the arteria carotis externa 0.5 cm rostrad to the origin of the arteria esophagea descendens. It proceeds rostrally along the lateral aspect of the quadrate bone, and gives rise to the arteria auricularis and the arteria pterygoidea at the level of the caudal border of the quadrate bone. The main stem of the artery continues along the ventral border of the orbit as the arteria facialis.

Arteria Auricularis

This artery proceeds dorsally from its origin, and supplies branches to the m. depressor mandibularis and the external ear.
Fig. 8.—The branches of the arteria carotis cerebralis. Ventral view of the brain. Afs, A. fossae sylvii; Abc, A. basilaris cerebri; Acea, A. cerebelli aboralis; Acen, A. cerebelli nasalis; Acp, A. cerebri profunda; Ra, Ramus aboralis; Ro, Ramus oralis; Acn, A. cerebri nasalis.

Fig. 9.—Dorsal view of the brain.

Fig. 10.—Schematic illustration of the arteries of the brain. Dorsolateral view. Acn, A. cerebri nasalis, Afs, A. fossae sylvii; Acea, A. cerebelli aboralis.
Arteria Pterygoidea

The arteria pterygoidea arises from the arteria maxillaris close to the origin of the arteria auricularis, and anastomoses with the arteria sphenoidae. It supplies the m. pterygopalatinus and m. pterygoquadramaxillaris.

Arteria Facialis

This arterial branch (Fig. 6, Af) is the direct continuation of the arteria maxillaris following origin of the arteria pterygoidea. It courses on the medial aspect of the quadrate bone, penetrates the m. masseter, crosses the temporozygomatic ligament and ascendens toward the medial canthus of the eye. In the vicinity of the medial canthus it divides into finer branches, and supplies the third eyelid, lacrimal gland and skin in the region of the eye. One branch may be traced dorsally to the rostral portion of the comb.

Arteria Carotis Interna

A. carotis interna
  A. ophthalmica externa

Plexus temporalis
  A. temporalis
  A. alveolaris inferior
  A. centralis retinae
A. sphenoidae
  A. sphenomaxillaris
A. carotis cerebralis
A. ophthalmica interna

R. oralis

A. fossae sylvii

A. ethmoidea

A. cerebri nasalis

R. aboralis

A. cerebri profunda

Aa. cerebelli nasalis

A. basilaris cerebri

A. cerebelli aboralis

Immediately following origin of the arteria occipitalis, the arteria carotis communis bifurcates into the arteria carotis externa and the arteria carotis interna. The arteria carotis interna (Figs. 5, Ac; 6, Ac; 7, Ac) proceeds cranially on the lateral aspect of the occipital bone toward the osseous external acoustic meatus, and enters the carotid canal through the foramen lacerum aboralis. At the level of the caudal border of the osseous external acoustic meatus, it gives rise to the arteria ophthalmica externa, 1.3 cm rostrad to its origin. The main trunk follows a nasomedial direction, and gives off the arteria sphenoeidea at the level of the rostral border of the meatus. The arteria intercarotica connects the arteria carotis interna of the both sides in the diploe of the ethmoid bone. Following the origin of the arteria sphenoeidea, the arteria carotis interna enters the cranial cavity as the arteria carotis cerebralis.
Arteria Ophthalmica Externa

The artery (Fig. 7, Aoe) arises from the arteria carotis interna at the level of the caudal border of the osseous external acoustic meatus, and forms a lateral convex arc in the lateral wall of the latter. It emerges from the temporal bone under cover of the m. temporalis, and divides into several branches to form the plexus temporalis in its course toward the orbit. The arteria temporalis and the arteria alveolaris inferior are given off the plexus in addition to many small vessels which ramify the muscles concerned with the movement of the mandible. The main stem of the arteria ophthalmica externa continues toward the caudal border of the orbit, and gives branches to the lacrimal gland. It crosses the caudal border of the orbit, and divides into many branches. Small branches supply the upper and the lower eyelids adjoining the lateral canthus; a somewhat larger vessel proceeds dorsally and follows the arch of the bony orbit along the medial wall of the orbital fossa. It anastomoses with the arteria ethmoidea caudomedially in the orbit. The main stem of the artery continues rostrally and forms an almost complete arterial loop around the optic nerve, and anastomoses with the arteria ophthalmica interna. From this anastomosis many branches are given off which supply the eye and its adnexa. Three to four branches course in a radial manner on the medial wall of the orbit, and supply branches to the muscles of the eye and eyelids in the vicinity of the medial canthus. A small vessel, the arteria centralis retinae supplies branches to the retina.
Arteria Temporalsis

The artery (Fig. 7, At) is given off the plexus temporalsis, and proceeds toward the dorsal aspect of the cranium. It supplies the m. temporalsis and the skin of this region.

Arteria Alveolaris Inferior

The arteria alveolaris inferior (Fig. 7, Aai) is larger in caliber than the arteria temporalsis, and proceeds rostrally. It courses through the m. masseter accompanied by the mandibular branch of the trigeminal nerve, and anastomoses with a branch of the arteria alveolaris mandibulae.

Arteria Sphenoidea

The artery (Fig. 7, As) arises from the arteria carotis interna just before the latter enters the cranial cavity. It communicates with a branch of the arteria facialis and the arteria pterygoidea thereby forming an arterial plexus. The main stem of the arteria sphenoidea continues rostrally, and gives rise to the arteria sphenomaxillaris. It then passes dorsal to the pterygoid bone, and supplies branches to the skin in the vicinity of the orbit.

Arteria Sphenomaxillaris

This arterial branch originates from the arteria sphenoidea, and supplies the upper pharyngeal and palatine region.

Arteria Carotis Cerebralis

The arteria carotis cerebralis (Fig. 7, Acc) is the direct continuation of the arteria carotis interna inside the cranial cavity. It
gives rise to the arteria ophthalmica interna at the level of the pituitary gland. The main stem of the arteria carotis cerebralis proceeds on the ventral aspect of the optic lobe, and soon divides into the ramus oralis and the ramus aboralis.

Arteria Ophthalmica Interna

The artery arises from the arteria carotis cerebralis, and proceeds out of the cranial cavity with the optic nerve. It anastomoses with a branch of the arteria ophthalmica externa in the orbit, and gives off small branches which may be traced in the fold of duramater enclosing the optic nerve.

Ramus Oralis

The ramus oralis (Fig. 8, Ro) takes its origin from the arteria carotis cerebralis at the level of the pituitary gland. It proceeds rostrally on the ventral surface of the optic lobe, and gives rise to the arteria fossae sylvii in a groove between the cerebrum and the optic lobe. The main stem of the ramus oralis extends rostromedially for 0.3 cm, and divides into the arteria ethmoidea and the arteria cerebri nasalis.

Arteria Fossae Sylvii

This arterial branch (Figs. 8, Afs; 9, Afs; 10, Afs) originates from the arteria carotis cerebralis at the rostral border of the optic lobe, and proceeds dorsally between the cerebrum and the optic lobe. On the rostral surface of the optic lobe it gives off many small branches in a fan-shaped fashion. The main stem of the arteria fossae
sylvii continues dorsally and passes into the longitudinal fissure between the two cerebral hemispheres. In the longitudinal fissure it gives off small branches which course on the dorsal surface of the cerebrum, and ramify therein.

Arteria Cerebri Nasalis

The arteria cerebri nasalis (Figs. 8, Acn; 9, Acn; 10, Acn) arises from the ramus oralis, and forms a laterorostral convex arc on the ventral surface of the cerebrum. It gives off small branches on the ventral aspect of the cerebrum but some of the branches extend to the dorsal aspect of the latter. Its branches may anastomose with the arteria fossae sylvii on the dorsal aspect of the cerebrum. The main stem becomes very slender rostrally, and may be followed to the olfactory bulb.

Arteria Ethmoidea

The arterial branch (Figs. 8, Ae; 10 Ae) arises from the ramus oralis, and proceeds rostrally on the medioventral aspect of the cerebrum. It then enters the orbit, and divides into two branches on the medial aspect of the orbital fossa. One branch proceeds toward the lateral border of the orbit, and anastomoses with the arteria ophthalmica externa. The other branch passes over the lacrimal bone to enter the nasal cavity, and anastomoses with the arteria palatina.

Ramus Aboralis

The ramus aboralis (Fig. 8, Ra) takes its origin from the arteria carotis cerebralis at the level of origin of the ramus oralis. It proceeds toward the medulla oblongata, and gives rise to the arteria
cerebri profunda in the groove present between the optic lobe and the pons. The main stem of the ramus aboralis continues caudally on the midline, and gives off three to four pairs of laterally coursing vessels, the arteriae cerebelli nasalis at the level of the pons. It descends caudally on the ventral aspect of the medulla oblongata as the arteria basilaris cerebri.

Arteria Cerebri Profunda

The artery (Fig. 8, Acp) arises from the ramus aboralis at the level of the caudal border of the optic lobe, and proceeds laterally in a groove between the optic lobe and the pons. It supplies branches to the caudal surface of the optic lobe and the pons.

Arteriae Cerebelli Nasalis

These vessels (Fig. 8, Acen) are given off the ramus aboralis, and proceed laterally to supply the pons and the cerebellum.

Arteria Basilaris Cerebri

The arteria basilaris cerebri (Fig. 8, Abc) is the continuation of the ramus aboralis on the ventral aspect of the medulla oblongata. At the level of the caudal border of the pons it gives rise to a paired vessel, the arteria cerebelli aboralis. The main stem of the arteria basilaris cerebri becomes very slender after the origin of the arteriae cerebelli nasalis. It anastomoses with the arteria spinalis ventralis in the vicinity of the foramen magnum.
Arteria Cerebelli Aboralis

This arterial branch (Figs. 8, Acea; 9, Acea; 10, Acea) arises from the arteria basilaris cerebri, and proceeds caudodorsally. It follows the vestibulocochlear nerve, and gives off small branches to the cochlea. The main stem of the arteria cerebelli aboralis extends to the lateral surface of the cerebellum, and divides into finer branches in a radial manner.

Arteria Subclavia Sinistra

A. subclavia sinistra
  A. sternoclavicularis
    A. subcostalis
    A. sternalis
    A. clavicularis
  A. axillaris
  A. acromialis
  A. thoracica communis

The arteria subclavia sinistra (Fig. 1, As) is the direct continuation of the truncus brachiocephalicus sinistra following the origin of the arteria carotis communis. It gives rise to the arteria sternoclavicularis 1.7 cm laterad to its origin. The arteria axillaris originates from the cranial wall of the arteria subclavia 0.3 cm laterad to the origin of the arteria sternoclavicularis. The arteria acromialis arises usually by a common trunk with the arteria axillaris, but it may arise independently, either from the arteria subclavia close
to the origin of the arteria axillaris; or, from the latter. The main
stem of the arteria subclavia sinistra continues laterally as the
arteria thoracica communis.

Arteria Subclavia Dextra

A. subclavia dextra
  A. thyrotrachealis
    R. thyroideus
    R. trachealis
  A. sternoclavicularis
    A. subcostalis
    A. sternalis
    A. clavicularis
  A. axillaris
  A. acromialis
  A. thoracica communis

The arteria subclavia dextra has the same general pattern of
branching as that of the left subclavian artery except that the arteria
thyrotrachealis dextra arises from the right subclavian artery 0.5 cm
laterad to the origin of the right common carotid artery.

Arteria Thyrotrachealis

The arteria thyrotrachealis sinistra (Fig. 3, Att) arises from
the left brachiocephalic trunk opposite the origin of the arteria
carotis communis. The arteria thyrotrachealis dextra (Fig. 1, Att)
takes its origin from the arteria subclavia dextra 0.5 cm laterad
to the origin of the arteria carotis communis dextra. The right and
the left thyrotracheal arteries are similar in their mode of branching.
It proceeds craniomedially for 0.5 cm, then bifurcates dorsal to the m.
stenotrachealis into the ramus thyroideus and the ramus trachealis.

Ramus Thyroideus

This arterial branch (Fig. 3, Rt) ascends cranially and enters
the thyroid gland.

Ramus Trachealis

The artery (Fig. 3, Rtr) proceeds craniomedially on the dorsal
surface of the m. stenotrachealis, and reaches the trachea. It sup-
plies the m. stenotrachealis and the ventral surface of the trachea
cranial to the syrinx. It anastomoses with a branch of the arteria
esophagea ascendens.

Arteria Sternoclavicularis

The arteria sternoclavicularis (Fig. 1, Asc) arises from the
arteria subclavia 1.7 cm laterad to the origin of the arteria carotis
communis and 0.3 cm mediad to the origin of the arteria axillaris. It
proceeds ventrocaudally on the m. subcostalis, and gives off branches
to the latter. The arteria subcostalis arises from the arteria sterno-
clavicularis 2.5 cm from the origin of the latter. The main trunk
crosses mediad to the coracoid bone, and continues in the direction of
the processus medianus sterni. At this level it divides into the
arteria sternalis and the arteria clavicularis.
Arteria Subcostalis

This arterial branch courses caudally on the m. subcostalis and supplies it and the sternum.

Arteria Sternales

The arteria sternalis (Fig. 11, As) enters the m. supracoracoideus, and proceeds caudally to reach the crista sterni. It supplies branches to the m. supracoracoideus, m. coracobrachialis ventralis and m. pectoralis profundus.

Arteria Claviculares

This vessel is smaller than the arteria sternalis. It enters the m. supracoracoideus, and proceeds cranially parallel to the clavicle toward the shoulder joint. It supplies branches to the m. supracoracoideus and m. pectoralis superficialis.

Arteria Acromialis

The arteria acromialis (Figs. 1, Aac; 13, Aa) usually takes its origin from the arteria subclavia in common with the stem of the arteria axillaris 0.3 cm laterad to the origin of the arteria sterno-claviculares, but it may arise independently, either from the arteria subclavia close to the origin of the arteria axillaris, or from the latter. It proceeds on the lateral aspect of the coracoid bone, passes between the latter and the m. coracobrachialis dorsalis, and continues toward the shoulder joint. It supplies branches to the m. coracobrachialis dorsalis, joint capsule of the shoulder joint and the long head of the m. triceps brachii.
Fig. 11.—Schematic illustration of the branches of the arteria thoracica communis. SC, M. supracoracoideus; As, A. sternalis; CBV, M. coracobrachialis ventralis; PP, M. pectoralis profundus; OEA, M. obliquus abdominis externus; SK, Skin; QAI, M. obliquus abdominis internus; C, Cloaca; Ra, M. rectus abdominis; A, Aponeurosis of the abdominal muscles; PS, M. pectoralis superficialis; Atev, A. thoracica externa ventralis; Atel, A. thoracica externa lateralis; Ats, A. subcutanea thoracica; Ated, A. thoracica externa dorsalis.
Fig. 12.—Schematic illustration of the topographic anatomy of the pectoral region. The right half of the thoracoabdominal wall removed. C, Crop; L, Lung; H, Heart; Li, Liver; OAI, M. obliquus abdominis internus; M, Mesentery; Ra, M. rectus abdominis; QAE, M. obliquus abdominis externus; PS, M. pectoralis superficialis; Ats, A. subcutanea thoracica.
Arteria Thoracica Communis

A. thoracica communis

A. thoracica interna

R. dorsalis

R. ventralis

A. thoracica externa communis

A. thoracica externa ventralis

A. subcutanea thoracica

A. thoracica externa dorsalis

A. thoracica externa lateralis

A. thoracica externa lateralis cranialis

A. thoracica externa lateralis caudalis

The arteria thoracica communis (Fig. 1, Atc) is the direct continuation of the arteria subclavia following the origin of the arteria axillaris, and measures 0.4 cm in length. Before leaving the thoracic cavity it gives rise to the arteria thoracica interna. The main trunk continues laterally outside the thoracic cavity as the arteria thoracica externa communis.

Arteria Thoracica Interna

The artery (Fig. 1, Ati) is a weak branch and passes caudoventrally within the thoracic cavity along the articulationes costovertebralis. Medial to the processus costalis sterni it divides into the ramus dorsalis and the ramus ventralis 1.3 cm caudad to its origin.
Ramus Dorsalis

This arterial branch (Fig. 1, rd) proceeds caudally on the inner wall of the thoracic cavity, and courses on the m. subcostalis. It supplies branches to the m. subcostalis, Mm. intercostales externi, Mm. intercostales interni and m. serratus dorsalis, and may be followed to the sixth rib. Anastomosis between its branches and the intercostal arteries are observed in the third, fourth and the fifth intercostal spaces.

Ramus Ventralis

This vessel (Fig. 1, rv) passes caudoventrally on the inner wall of the thoracic cavity along the costosternal junctions. It courses on the m. subcostalis, supplies branches to it, and proceeds caudally supplying branches to the intercostal muscles, sternum and the m. obliquus externus abdominis. It anastomoses with the arteria subcostalis and with the ramus dorsalis. Some of its branches may be traced in the space between the laterocaudal process and the mediocaudal process of the sternum.

Arteria Thoracica Externa Communis

The arteria thoracica externa communis is the direct continuation of the common thoracic artery outside the thoracic cavity, and soon after its exit from the latter it gives rise to the arteria thoracica externa ventralis. The main trunk continues laterally for a distance of 0.5 cm, and divides into the arteria thoracica externa dorsalis and the arteria thoracica externa lateralis.
Arteria Thoracica Externa Ventralis

The artery (Figs. 1, Atev; 11, Atev) arises from the arteria thoracica externa communis immediately after its exit from the thoracic cavity. It courses on the lateral surface of the m. supracoracoideus and enters the m. pectoralis superficialis. The main vessel describes a curve caudoventrally, and supplies branches to the m. pectoralis superficialis. At the level of the cranial end of the crista sterni it gives rise to the arteria subcutanea thoracica (Figs. 11, Ats; 12, Ats) which may be followed under the skin to the caudal end of the processus crista sterni.

Arteria Thoracica Externa Dorsalis

This arterial branch (Figs. 1, Ated; 11, Ated) takes its origin from the arteria thoracica externa communis 0.5 cm laterad to the origin of the arteria thoracica externa ventralis. It courses ventrocaudally between the m. sternotrachealis and the m. supracoracoideus, and soon divides into two branches; one branch courses toward the m. supracoracoideus and supplies it; the other branch is stronger and proceeds laterally to enter the m. pectoralis superficialis.

Arteria Thoracica Externa Lateralis

The artery (Figs. 1, Atel; 11, Atel) arises from the arteria thoracica externa communis at the level of origin of the arteria thoracica externa dorsalis. It courses dorsilaterally under the ventral surface of the scapula, and emerges on the humeral end of the m. pectoralis superficialis. At the level of the scapula it supplies branches to the m. subscapularis, m. teres major and humeral end of
the m. pectoralis superficialis. The main stem passes caudoventrally in the m. pectoralis superficialis and divides into the arteria thoracica externa lateralis cranialis (Fig. 1, Atelcr) and the arteria thoracica externa lateralis caudalis (Fig. 1, Atelc). Both of the vessels divide into finer branches, and ramify in the m. pectoralis superficialis. Some of the branches emerge ventrally as cutaneous vessels supplying the skin of the sternal region. The arteria thoracica externa lateralis cranialis anastomoses with the arteria thoracica externa dorsalis, and the arteria thoracica externa lateralis caudalis anastomoses with the arteria thoracica externa ventralis.

Arteria Axillaris

A. axillaris
A. subscapularis
A. coracoidea
A. profunda brachii
R. muscularis
A. nutriciae humeralis
A. collateralis ulnaris
A. collateralis radialis
A. brachialis
A. circumflexa humeralis
A. radialis
R. muscularis
A. recurrens radialis
Rami folliculi
A. ulnaris
A. recurrens ulnaris
A. indicis
A. metacarpea tertia
A. metacarpea quarta

The arteria axillaris (Figs. 1, Aax; 13, Aax; 16, Aa) originates from the cranial wall of the arteria subclavia 0.3 cm laterad to the origin of the arteria sternoclavicularis. It proceeds at first cranially, and gives rise to the arteria subscapularis near its origin; then forms an arc cranial to its root, and continues laterally toward the neck of the humerus. Usually the arteria acromialis is derived from the arteria subclavia at the level of origin of the arteria axillaris, however the vessel may arise from the arteria axillaris near the origin of the latter; or, it may originate by a common trunk with the arteria axillaris. At the level of the cranial end of the arc the vessel gives rise to the arteria coracoideus. The main stem of the arteria axillaris courses laterally toward the ventral surface of the long head of the m. triceps brachii, and gives rise to the arteria profunda brachii 1 cm laterad to the origin of the arteria coracoidea. Following the origin of the arteria profunda brachii, the arteria axillaris continues as the arteria brachialis in the furrow between the long head of the m. triceps brachii and the biceps brachii.

Arteria Subscapularis

The artery (Figs. 13, Asu; 16, As) is a small vessel, and arises from the arteria axillaris. It courses dorsocaudally from its origin, and supplies the m. subscapularis and the m. suprascapularis.
Fig. 13. -- Schematic illustration of the arteries of the wing. Ac, A. coracoidea; Aax, A. axillaris; Aa, A. acromialis; As, A. subclavia; Asu, A. subscapularis; Rm, R. muscularis; Ab, A. brachialis; Anh, A. nutritiae humeralis; Acu, A. collateralis ulnaris; Ach, A. circumflexa humeralis; Acr, A. collateralis radialis; B, M. biceps brachii; T, M. triceps brachii; Arr, A. recurrens radialis; P, Patagium; Au, A. ulnaris; Aru, A. recurrens ulnaris; Ai, A. indicis; Rf, R. follicularis; Amq, A. metacarpea quarta; Amt, A. metacarpea tertia.

Fig. 14. -- Schematic illustration of the arteries of the wing. Aa, A. axillaris; Anh, A. nutritiae humeralis; Apb, A. profunda brachii; Rm, R. muscularis; Ab, A. brachialis; Acu, A. collateralis ulnaris; Ach, A. circumflexa humeralis; B, M. biceps brachii; T, M. triceps brachii; Arr, A. recurrens radialis; Acr, A. collateralis radialis; Ar, A. radialis; Au, A. ulnaris; Aru, A. recurrens ulnaris.

Fig. 15. -- Schematic illustration of the arteries of the wing. LT, Lateral head of the m. triceps brachii; Apb, A. profunda brachii; Rm, R. muscularis; P, M. pectoralis superficialis; LD, M. latissimus dorsi; Acu, A. collateralis ulnaris; T, Long head of the m. triceps brachii; Acr, A. collateralis radialis; Anh, A. nutritiae humeralis; B, M. biceps brachii; Ab, A. brachialis.
Fig. 16. -- Schematic illustration of the arteries of the wing. Ac, A. coracoideus; Aa, A. axillaris; As, A. subscapularis; Ab, A. brachialis; Apb, A. profunda brachii; Ach, A. circumflexa humeralis; Acu, A. collateralis ulnaris; Acr, A. collateralis radialis; Au, A. ulnaris; Ar, A. radialis; Aru, A. recurrens ulnaris; Arr, A. recurrens radialis; Rf, R. follicularis; Ai, A. indicis; Amq, A. metacarpea quarta; Amt, A. metacarpea tertia.
Arteria Coracoidea

This arterial branch (Figs. 13, Ac; 16, Ac) is stronger than the arteria subscapularis, and originates from the arteria axillaris 1 cm cranial to the origin of the latter. It proceeds cranially in the m. coracobrachialis, and continues toward the shoulder joint. The vessel supplies nutritive branches to the m. coracobrachialis, m. teres minor and the coracoid bone.

Arteria Profunda Brachii

The arteria profunda brachii (Figs. 14, Apb; 15, Apb; 16, Apb) originates from the arteria axillaris 1 cm laterad to the origin of the arteria coracoidea at the level of the shoulder joint. It courses ventrad to the m. subscapularis, and proceeds distally on the caudal aspect of the humerus. Immediately following its origin it gives rise to the ramus muscularis (Figs. 13, Rm; 14, Rm; 15, Rm) which ramifies in the m. latissimus dorsi, humeral head of the m. pectoralis superficialis and the m. patagialis. At the level of the proximal one-third of the humerus it gives rise to the arteria nutriciae humeralis. The main stem of the arteria profunda brachii bifurcates into the arteria collateralis ulnaris and the arteria collateralis radialis at the level of the middle one-third of the humerus.

Arteria Nutriciae Humeralis

This arterial branch (Figs. 13, Anh; 14, Anh; 15, Anh) takes its origin from the arteria profunda brachii at the level of the proximal one-third of the humerus, and soon bifurcates. One branch passes
between the m. deltoideus and the m. triceps brachii, and proceeds toward the skin. It supplies branches to the m. deltoideus, m. triceps brachii and the feathers of the humeral segment. The second branch passes between the m. deltoideus and the m. triceps brachii to the shaft of the humerus, supplying these muscles and enters the humerus through the nutrient foramen.

Arteria Collateralis Radialis

The artery (Figs. 13, Acr; 14, Acr; 15, Acr; 16, Acr) arises from the arteria profunda brachii at the level of the middle one-third of the humerus. It accompanies the radial nerve and is covered by the m. triceps brachii. The artery passes between the humerus and the m. triceps brachii, and comes to lie under the skin at the level of the distal one-third of the humerus. It passes distally over the flexor surface of the elbow, and anastomoses with the arteria recurrens radialis. This anastomosis is present between the m. pronator longus et brevis on one side, and the m. extensor carpi radialis and m. supinator on the other side. Many branches are given off to the muscles of this vicinity and to the patagium.

Arteria Collateralis Ulnaris

The arteria collateralis ulnaris (Figs. 13, Acu; 14, Acu; 15, Acu; 16, Acu) originates from the arteria profunda brachii at the level of origin of the arteria collateralis radialis, and courses distally along the m. triceps brachii. It passes between the two epicondyles of the humerus, and crosses over to the extensor surface of the elbow joint.
The vessel supplies the m. triceps brachii, feathers and skin on the caudal aspect of the humerus. It anastomoses with the arteria recurrens ulnaris on the extensor surface of the elbow joint.

Arteria Brachialis

The artery (Figs. 13, Ab; 14, Ab; 15, Ab; 16, Ab) is the direct continuation of the arteria axillaris following the origin of the arteria profunda brachii. It crosses the long head of the m. triceps brachii, courses distally in a furrow between the m. biceps brachii and the m. triceps brachii, and is accompanied by the median nerve and the brachial vein. At the level of the proximal one-third of the humerus and 0.5 cm from the origin of the arteria profunda brachii, it gives rise to the arteria circumflexa humeralis. The artery continues distally under cover of the m. biceps brachii, and supplies many unnamed muscular branches to the m. biceps brachii and the long head of the m. triceps brachii. Under cover of the distal head of the m. biceps brachii and 6 cm distad to the origin of the arteria circumflexa humeralis, the main stem of the arteria brachialis bifurcates into the arteria radialis and the arteria ulnaris.

Arteria Circumflexa Humeralis

This arterial branch (Figs. 13, Ach; 14, Ach; 16, Ach) originates from the arteria brachialis 3.5 cm from the origin of the arteria profunda brachii, and courses dorsolaterally to enter the m. biceps brachii. It reaches the patagium, and accompanies the m. patagialis longus to the carpus. The vessel supplies the m. biceps brachii, m. patagialis longus and the patagium.
Arteria Radialis

The arteria radialis (Figs. 13, Ar; 14, Ar; 16, Ar) is derived from the arteria brachialis 6 cm distal to the origin of the arteria circumflexa humeralis, and courses distally along the tendon of the m. biceps brachii. Immediately following its origin it gives off a small vessel which supplies the m. brachialis and joint capsule of the elbow joint. The vessel crosses the tendon of the m. biceps brachii, proceeds distally under cover of the m. supinator and the m. pronator longus et brevis, and gives rise to the ramus muscularis near its origin. At the level of the proximal extremity of the radius, the arteria recurrens radialis is given off the main trunk. After the exit of the arteria recurrens radialis, the vessel proceeds distally between the m. pronator longus and the m. extensor et adductor digitorum of the second and third digit on one side, and the extensors of the carpus on the other side. It gives off many small unnamed branches, and may be traced to the carpal joint. A few millimeters distal to the origin of the arteria recurrens radialis, the ramus folliculus 1 arises from the radial artery which supplies the secondary follicles. At the level of the distal one-third of the radius it gives off one to three rami folliculi for the secondary follicles.

Ramus Muscularis

This ramus (Fig. 13, Rm) arises from the arteria radialis a few millimeters distal to the origin of the latter between the m. supinator and the m. pronator longus. It proceeds distally between the m. pronator longus and the m. extensor carpi radialis, and emerges in the
patagium where it divides into many branches. It supplies branches to
the m. extensor carpi radialis, m. pronator longus and the patagium.
The branches anastomose with each other, and with the branches of the
arteria circumflexa humeralis in the patagium.

Arteria Recurrens Radialis

The arteria recurrens radialis (Figs. 13, Arr; 14, Arr; 16, Arr)
is derived from the arteria radialis at the level of the proximal
extremity of the radius. It is a small branch and winds to the lateral
aspect of the radius. The vessel anastomoses with the arteria collateralis
radialis under the proximal head of the m. supinator and the m.
extensor carpi radialis. It supplies the lateral aspect of the elbow
joint, m. extensor carpi radialis and the m. supinator.

Rami Folliculi

These arterial branches (Figs. 13 Rf; 16, Rf) originate from the
arteria radialis in the region of the radius. The first follicular
ramus arises a few millimeters distad to the origin of the arteria
recurrens radialis, and courses dorsolaterally between the radius and
the m. extensor of the second digit toward the secondary follicles.
The first ramus gives off a small branch to the m. extensor of the
second digit, and then divides into a proximal and a distal coursing
branch in the vicinity of the ulna. Both the branches course parallel
to the long axis of the ulna. The proximal branch may anastomose with
the arteria recurrens ulnaris, and the distal branch anastomoses with
the proximal branch of the second follicular ramus. At the level of
the distal one-third of the radius, one to three rami folliculi are given off, which have the same course and pattern of branching as that of the ramus folliculus 1. They proceed dorsolaterally between the m. extensor of the second digit and the m. extensor carpi ulnaris toward the secondary follicles. The vessels anastomose with each other to form an arterial arc from which many small vessels are given off to supply the secondary follicles.

Arteria Ulnaris

The arteria ulnaris (Figs. 13, Au; 14, Au; 16, Au) arises from the arteria brachialis at the level of origin of the arteria radialis, and crosses the proximal head of the m. extensor carpi radialis and the m. pronator longus et brevis in the vicinity of the elbow joint. It courses on the cranial border of the m. flexor carpi radialis to the carpus, and at the level of the elbow joint it gives rise to a small vessel which proceeds toward the medial condyle of the humerus. The arteria recurrents ulnaris arises from the main stem immediately below the level of the elbow joint. The vessel continues distally on the cranial border of the m. flexor carpi radialis and gives off many unnamed muscular branches to the flexors of the carpus. Just proximad to the carpal joint, it gives off a small branch which dips under the m. flexor carpi ulnaris, and supplies it. The artery accompanies the tendon of the m. extensor digiti medialis of the second and third digits, and passes between the radial carpal bone and the ulnar carpal bone. Distad to the carpal joint, the arteria indicis is given off the arteria ulnaris, and the latter bifurcates into the arteria metacarpea tertia and the arteria metacarpea quarta.
Arteria Recurrens Ulnaris

The artery (Figs. 13, Aru; 14, Aru; 16, Aru) is derived from the arteria ulnaris immediately below the level of elbow joint, and forms an arc with its convexity toward the proximal extremity of the ulna. It gives off a small vessel at the level of origin of the m. flexor carpi ulnaris, and supplies it. In the region of the elbow joint many vessels are given off the main stem; some of the vessels supply the joint capsule of the elbow joint; a large vessel passes to the follicles of the humeral segment, and anastomoses with the arteria collateralis ulnaris and with a branch of the arteria radialis.

Arteria Indicis

This arterial branch (Figs. 13, Ai; 16, Ai) originates from the arteria ulnaris at the level of the first digit. It passes under the tendon of the m. extensor digiti medialis of the second and third digits. It supplies the first digit, and sends a branch to the carpus.

Arteria Metacarpea Tertia

The arteria metacarpea tertia (Figs. 13, Amt; 16, Amt) is derived from the arteria ulnaris as a result of the bifurcation of the latter. It is smaller than the arteria metacarpea quarta, and courses distally in the m. interosseous ventralis. It may be traced to the distal extremity of the third metacarpal bone where the latter fuses with the fourth metacarpal bone.
Fig. 17.—Schematic illustration of the arteriae intercostales. T1-T7, Thoracic vertebrae; Aicap, A. intercostalis caudalis prima; A, Aorta; Ac, A. celiaca; Avc, A. vertebralis caudalis; Alcp, A. intercostalis cranialis prima; Aics, A. intercostalis cranialis secunda; Aict, A. intercostalis cranialis tertia; Aicq, A. intercostalis cranialis quarta; Aicas, A. intercostalis caudalis secunda.
Arteria Metacarpea Quarta

The *arteria metacarpea quarta* (Figs. 13, Amq; 16, Amq) is larger than the *arteria metacarpea tertia* and is the direct continuation of the *arteria ulnaris* in the metacarpal region. It follows the bend of the fourth metacarpal bone, and enters the *Mm. interosseous*. The vessel crosses the interosseous space present between the third and fourth metacarpal bones, and reaches the dorsal aspect of the metacarpals. It passes over the carpophalangeal joint, and supplies a vessel to the fourth digit. The artery continues further on the third digit, and may be followed to its tip.

Aorta Descendens

The *aorta descendens* (Figs. 17, A; 18, A; 21, A; 22, A) proceeds caudally through the caudal mediastinum. It is related to the right aspect of the vertebral column in the mediastinum, but gradually shifts to the ventral aspect of the latter. As the thoracic portion of the descending aorta proceeds caudally, it crosses the right bronchus and comes to lie dorsal to the latter. It gives rise to the *arteria intercostalis caudalis prima craniiad* to the rudimentary diaphragm which incompletely separates the thoracic and the abdominal cavities. The descending aorta crosses the diaphragm and continues caudally on the ventral aspect of the vertebral column. Caudad to the diaphragm the vessel gives rise to the *arteria intercostalis caudalis secunda* at the level of the seventh thoracic vertebra. It also gives rise to the following paired and unpaired branches in the thoracoabdominal cavity.
Aorta descendens

Aa. intercostales caudalis, prima et secunda (Paired)
A. celiaca (Unpaired)
A. mesenterica cranialis (Unpaired)
A. suprarenalis (Paired)
Truncus gonadorenalis (Paired)
A. iliaca externa (Paired)
A. ischiadica (Paired)
Aa. lumbosacralis (Paired)
A. mesenterica caudalis (Unpaired)
A. pudenda communis (Paired)
A. sacralis mediana (Unpaired)

Arteria Intercostalis Caudalis Prima

The artery (Fig. 17, Aicap) is given off the dorsal wall of the thoracic aorta at the level of the sixth thoracic vertebra. This artery is given off slightly cranially to the diaphragm and the origin of the arteria celiaca. It courses on the lateral surface of the sixth thoracic vertebra, and gives branches to the dorsal and ventral musculature attached to the thoracic vertebrae. At the level of the sixth intervertebral foramen it gives rise to a branch which enters the vertebral canal and contributes to the formation of the ventral spinal artery. Some of the vessels which are given off in this region emerge onto the dorsal aspect of the thoracic vertebrae and supply the muscles thereon. One branch proceeds laterally in the fifth intercostal space, supplies the muscles therein, and anastomoses with the arteria
intercostalis caudalis secunda. The main trunk courses cranially and crosses the fifth articulatio costovertebralis dorsally. It supplies a branch to the musculature in the region of the fourth intercostal space and a branch enters the vertebral canal. The vessel then continues toward the third intercostal space by crossing the fourth articulatio costovertebralis dorsally, and anastomoses with the terminal portion of the arteria vertebralis caudalis and the arteria intercostalis cranialis quarta. It also anastomoses with the arteria thoracica interna in the fourth and fifth intercostal spaces.

Arteria Intercostalis Caudalis Secunda

The artery (Fig. 17, Aicas) arises from the dorsolateral wall of the aorta caudad to the origin of the arteria celiaca and at the level of the seventh thoracic vertebra. It courses on the lateral aspect of the body of the latter and gives off small vessels which supply the dorsal and ventral musculature attached to thoracic vertebrae. At the level of the seventh intervertebral foramen it sends a branch into the vertebral canal to contribute in the formation of the ventral spinal artery. At the level of the sixth articulatio costovertebralis it gives off a vessel which proceeds cranially dorsal to the sixth articulatio costovertebralis, and anastomoses with a branch of the arteria intercostalis caudalis prima in the fifth intercostal space. The main trunk of the arteria intercostalis caudalis secunda continues laterally in the sixth intercostal space where it may anastomose with a branch of the arteria thoracica interna, and also supplies the intercostal muscles.
Arteria Celiaca

A. celiaca

R. esophageus

A. proventriculus prima

A. proventriculus secunda

A. gastrica sinistra

R. proventriculus

A. hepatica sinistra

R. dorsalis

R. ventralis

A. gastrica dextra

Aa. lienalis

A. hepatica dextra

R. duodenalis

A. cystica

Aa. iliocecales sinistra

R. pancreaticus

A. gastrica communis

A. gastrica dorsalis

A. gastrica ventralis

A. pancreaticoduodenalis

The arteria celiaca (Figs. 17, Ac; 18, Ac; 20, Ac) arises from the right lateral wall of the aorta descendens at the level of the sixth thoracic vertebra. It proceeds caudoventrally, and gives rise to the ramus esophageus 0.4 cm from its origin. The arteria
Fig. 18.---Schematic illustration of the arteria celiaca. S, Syrinx; H, Heart; A, Aorta; Ac, A. celiaca; Agd, A. gastrica dextra; Ags, A. gastrica sinistra; Ahs, A. hepatica sinistra; L, Liver; GB, Gall Bladder; P, Pancreas; D, Duodenum; G, Gizzard; Rv, R. ventralis; Rd, R. dorsalis; Rp, R. proventriculus; Apd, A. proventriculus secunda; App, A. proventriculus prima; P, Proventriculus; Re, R. esophagus.

Fig. 19.---Schematic illustration of the arteria celiaca. Al, A. lienalis; S, Spleen; Aics, A. ilioccecalis sinistra; I, Intestine; C, Cecum; Apd, A. pancreaticoduodenalis; Agv, A. gastrica ventralis; Agd, A. gastrica dorsalis; Agc, A. gastrica communis; Rp, R. pancreaticus; GB, Gall Bladder; Ac, A. cystica; Rd, R. duodenalis; L, Liver; Ahd, A. hepatica dextra; Agd, A. gastrica dextra.

Fig. 20.---Schematic illustration of the arteria mesenterica cranialis. A, Aorta; Ac, A. celiaca; Amc, A. mesenterica cranialis; Adj, A. jejunoduodenalis; Aj, A. jejunalis; Ai, A. ilei; Apd, A. pancreaticoduodenalis; Aicd, A. ilioccecalis dextra; Aic, A. iliocolica.
proventriculus prima and the arteria proventriculus secunda originates from the ventral wall of the arteria celiaca 0.8 cm and 2.1 cm respectively from the origin of the latter. The main stem of the arteria celiaca bifurcates into the arteria gastrica sinistra and the arteria gastrica dextra 2.7 cm caudoventrad to its origin.

Ramus Esophageus

The ramus (Fig. 18, Re) originates from the arteria celiaca 0.4 cm caudoventrad to the origin of the latter. It reaches the terminal portion of the esophagus by crossing the ventral wall of the aorta, and supplies the esophagus.

Arteria Proventriculus Prima

The artery (Fig. 18, App) arises from the arteria celiaca 0.4 cm caudoventrad to the origin of the ramus esophageus. It proceeds caudally and reaches the dorsal aspect of the proventriculus. The vessel supplies the dorsal wall of the proventriculus, and anastomoses with the arteria proventriculus secunda.

Arteria Proventriculus Secunda

This arterial branch (Fig. 18, Aps) is given off the arteria celiaca 1.3 cm caudoventrad to the origin of the arteria proventriculus prima. It proceeds latero-caudally to reach the dorsal wall of the proventriculus where it anastomoses with the arteria proventriculus prima.
Arteria Gastrica Sinistra

The arteria gastrica sinistra (Fig. 18, Ags) arises from the arteria celiaca 2.7 cm from the origin of the latter, and courses caudo-ventrally toward the isthmus of the proventriculus. It gives off the ramus proventriculus 2.2 cm from its origin. The main stem of the arteria gastrica sinistra continues caudally on the ventral surface of the cranial border of the gizzard, and at this level it gives rise to the arteria hepatica sinistra and the ramus dorsalis. At the level of the pyloris it sends small branches to the isthmus of the proventriculus and the adjoining area of the gizzard. Further caudally it continues on the ventral surface of the gizzard as the ramus ventralis.

Ramus Proventriculus

This vessel (Fig. 18, Rp) originates from the arteria gastrica sinistra 2.2 cm from the origin of the latter. It ascends on the ventral surface of the proventriculus, and anastomoses with the ramus esophageus at the cranial end of the proventriculus.

Arteria Hepatica Sinistra

This arterial branch (Fig. 18, Ahs) arises from the arteria gastrica sinistra 0.6 cm from the origin of the ramus proventriculus, and proceeds ventrally and somewhat to the right toward the left hepatic lobe. It sends branches to the left hepatic lobe, and the main stem of the artery passes ventrocaudally under the latter. It courses on the right border of the gizzard, and ramifies in its ventral muscle mass.
Ramus Dorsalis

The artery (Fig. 18, Rd) is derived from the arteria gastrica sinistra at the level of origin of the arteria hepatica sinistra. It passes to the dorsal aspect of the gizzard, and supplies branches to the dorsocranial border of the gizzard and the pyloris.

Ramus Ventralis

The ramus ventralis (Fig. 18, Rv) is the continuation of the arteria gastrica sinistra following the origin of the ramus dorsalis. It courses caudally on the ventral surface of the gizzard, and divides into finer branches in its ventral muscle mass.

Arteria Gastrica Dextra

The artery (Figs. 18, Agd; 19, Agd) arises from the arteria celiaca at the level of origin of the arteria gastrica sinistra, and courses caudoventrally under the gall bladder of the liver. Close to its origin, it gives rise to the arteria lienalis. At the level of the hilus of the liver, it gives rise to the arteria hepatica dextra. The main stem of the artery continues caudally, and at the level of the middle and caudal one-third of the spleen, it gives off two to three vessels which enter the ventral surface of the spleen. The arteria iliocolalis sinistra prima originates from the main vessel 3 cm caudad to the origin of the arteria hepatica dextra. The second and the third iliocolcal arteries arise 0.5 cm and 1 cm respectively caudad to the origin of the first iliocolcal artery. At the level of the gizzard and
4 cm caudad to the origin of the arteria hepatica dextra, the main vessel divides into the ramus pancreaticus, the arteria gastrica communis and the arteria pancreaticoduodenalis.

Arteria Lienalis

The artery (Fig. 19, Al) arises from the arteria gastrica dextra immediately following its origin, or, it may arise by a common trunk with the arteria gastrica dextra from the arteria celiaca. It proceeds dorsally from its origin, and enters the ventral surface of the spleen.

Arteria Hepatica Dextra

This artery (Fig. 19, Ahd) takes its origin from the arteria gastrica dextra 1.4 cm from the origin of the latter. It proceeds toward the hilus of the liver, and gives rise to the ramus duodenalis and the arteria cystica 1 cm from its origin. The main stem of the arteria hepatica dextra enters and ramifies in the liver.

Ramus Duodenalis

The ramus (Fig. 19, Rd) arises from the arteria hepatica dextra, and courses toward the terminal portion of the duodenum and the beginning portion of the jejunum. The vessel anastomoses with the arteria jejunoduodenalis.

Arteria Cystica

This arterial branch (Fig. 19, Ac) proceeds caudally on the dorsal aspect of the gall bladder. It also sends a branch to the duodenum, and supplies the gall bladder and the hepatic duct.
Arteriae Iliocecales Sinistra

The vessels (Fig. 19, Aics) are three in number. The arteria iliocecalis sinistra prima arises from the arteria gastrica dextra 3 cm caudad to the origin of the latter. The arteria iliocecalis sinistra secunda originates 0.5 cm caudad to the origin of the first iliocecal artery, and the arteria iliocecalis sinistra tertia is given off the main stem of the arteria gastrica dextra 0.5 cm caudad to the origin of the second iliocecal artery. They supply branches to the ilium and the left cecum. On the ventral surface of the ilium, the iliocecal artery divides into a cranial ramus and a caudal ramus. The cranial rami of the first and the second iliocecal artery anastomose with the ilial branches of the arteria iliocecalis dextra which is a branch of the arteria mesenterica cranialis. The caudal ramus of the arteria iliocecalis sinistra tertia may anastomose with a branch of the arteria mesenterica caudalis.

Ramus Pancreaticus

The ramus (Fig. 19, Rp) is derived from the arteria gastrica dextra at the level of origin of the arteria iliocecalis sinistra tertia, and supplies the pancreas.

Arteria Gastrica Communis

The arteria gastrica communis (Fig. 19, Agc) is given off the arteria gastrica dextra 4 cm caudad to the origin of the arteria hepatica dextra, and proceeds toward the dorsal surface of the gizzard. It bifurcates 0.5 cm from its origin into the arteria gastrica dorsalis and the arteria gastrica ventralis.
Arteria Gastrica Dorsalis

The artery (Fig. 19, Agdo) courses caudodorsally and turns slightly to the right, reaching the right dorsal border of the gizzard. It supplies branches to the right dorsal surface of the gizzard, and may anastomose with the arteria gastrica ventralis.

Arteria Gastrica Ventralis

This arterial branch (Fig. 19, Agv) courses toward the ventral muscle mass of the gizzard, and supplies branches to the right ventral surface and the right border of the gizzard. It anastomoses with the ramus ventralis at the caudal border of the gizzard, and with the arteria gastrica dorsalis at the right border of the gizzard.

Arteria Pancreaticoduodenalis

The arteria pancreaticoduodenalis (Fig. 19, Apd) arises from the arteria gastrica dextra at the level of origin of the arteria gastrica communis. It may be considered as the caudal continuation of the arteria gastrica dextra. It enters the loop of the duodenum, and supplies the pancreas and the duodenum. Usually the pancreas and the duodenum are supplied by the common branches of the arteria pancreaticoduodenalis, but some of the branches may be found supplying either the pancreas or the duodenum.
Fig. 21. -- Schematic illustration of the truncus gonadorenalis. A, Aorta; Amc, A. mesenterica cranialis; Rs, R. suprarenalis; At, A. testicularis; Arc, A. renalis cranialis; As, A. suprarenalis.

Fig. 22. -- Schematic illustration of the descending aorta. Tgr, Truncus gonadorenalis; Ai, A. ischiadica; Auca, A. uretodeferentiales caudalis; Api, A. pudenda interna; Ape, A. pudenda externa; Apc, A. pudenda communis; Asm, A. sacralis mediana; Amca, A. mesenterica caudalis; Aie, A. iliaca externa; Als, A. lumbosacralis.
Arteria Mesenterica Cranialis

A. mesenterica cranialis

A. iliocolica

A. iliocecalis dextra

R. cranialis

R. caudalis

A. jejunoduodenalis

Aa. jejunales

Aa. ilei

The arteria mesenterica cranialis (Figs. 20, Amc; 21, Amc) is an unpaired vessel and arises from the right lateral wall of the abdominal aorta 0.6 cm caudad to the origin of the arteria celiaca. Its origin is related to the cranial border of the right testes, and the vessel proceeds caudoventrally. After crossing the ventral surface of the right testes, it gives rise to the arteria iliocolica and the arteria iliocecalis dextra 3 cm caudad to its origin. The main stem of the artery continues caudally in the mesentery of the small intestines, and gives off the arteria jejunoduodenalis, the arteriae jejunalis and the arteriae ilei in the loops of the small intestines. The terminal portion of the arteria mesenterica cranialis may be traced in the mesentery to the caudal end of the cecum where it gives off small branches to the latter and the adjoining portion of the ilium. Anastomosis may be found between the branches of the arteria iliocecalis sinistra tertia and the terminal portion of the arteria mesenterica cranialis on the ilium adjoining the ceca.
Arteria Iliocolica

This arterial branch (Fig. 20, Aic) is given off the arteria mesenterica cranialis 3 cm caudad to the origin of the latter, and proceeds caudally. Immediately after origination it gives off branches to the terminal end of the ilium and the origin of the ceca. At the terminal portion of the ilium it anastomoses with the branches of the arteria iliocolica dextra. The main stem of the artery descends caudally on the right lateral aspect of the colon, and gives off branches to the colon. It anastomoses with the colic branch of the arteria mesenterica caudalis.

Arteria Iliocecalis Dextra

The artery (Fig. 20, Aicd) is given off the arteria mesenterica cranialis at the level of origin of the arteria iliocolica, and proceeds toward the ilium. In the mesentery it gives rise to the ramus cranialis and the ramus caudalis 0.8 cm caudal to its origin. The main stem of the artery reaches the ilium, and supplies branches to the ilium and the ceca.

Ramus Cranialis

This arterial branch ascends cranially toward the origin of the ceca. It courses on the ventral aspect of the terminal portion of the ilium, and supplies branches to the latter and the cranial portion of ceca. Anastomosis between it and the branches of the arteria iliocolica may be observed on the caudal end of the ilium.
Ramus Caudalis

The ramus caudalis extends caudally toward the ilium, and supplies branches to the latter and the adjoining portion of the ceca. It may anastomose with the arteria iliocecalis sinistra secunda and the arteria iliocecalis sinistra tertia.

Arteria Jejunoduodenalis

This arterial branch (Fig. 20, Adj) arises from the arteria mesenterica cranialis at the level of origin of the arteria iliocolica. It ascends in the mesentery toward the cranial end of the jejunum, and supplies branches to the latter and the duodenum. At the terminal portion of the duodenum it may anastomose with the ramus duodenalis.

Arteriae Jejunalis

These arteries (Fig. 20, Aj) arise from the convexity of the arteria mesenterica cranialis at the level of each loop of the jejunum. They pass between the two layers of the mesentery, and divide into branches to form a series of arcades from which secondary branches are given off. The secondary branches proceed toward the wall of the gut, generally on one side but occasionally a terminal branch divides and pass on both sides of the gut.

Arteriae Ileii

The arteriae ilei (Fig. 20, Al) are given off the arteria mesenterica cranialis at the level of each loop of the ilium. They supply the ilium, and their course and mode of branching is similar to those
of the arteriae jejunalis. They anastomose cranially with the arteria jejunalis, and caudally with the arteria iliocecalis dextra.

Arteria Suprarenalis

The artery (Fig. 21, As) is a paired vessel, and is usually given off the first lumbar artery 1 cm caudad to the origin of the arteria mesenterica cranialis, or it may arise from the lateral wall of the abdominal aorta at the level of the adrenal gland. The vessel proceeds laterally and enters the adrenal gland.

Truncus Gonadorenalis

Truncus gonadorenalis

R. suprarenalis
A. testicularis
A. renalis cranialis
A. uretodeferentiales cranialis

The truncus gonadorenalis (Fig. 22, Tgr) is a paired vessel, and arises from the lateral wall of the aorta. The left trunk originates 0.4 cm cranial to the origin of the right vessel which arises 1.3 cm caudal to the origin of the arteria mesenterica cranialis, and both are similar in their course and ramification. The vessel proceeds laterally toward the hilus of the testes and gives rise to the ramus suprarenalis 0.5 cm laterad to its origin. The artery forms a lateral convex arc, and gives off the arteria testicularis at the hilus of the
testes. The main trunk of the vessel descends caudally on the ventral surface of the cranial lobe of the kidney and continues as the arteria renalis cranialis.

Ramus Suprarenalis

The ramus (Fig. 21, Rs) originates from the truncus gonadorenalis 0.5 cm from the origin of the latter, and ascends cranially toward the adrenal gland which it ramifies.

Arteria Testicularis

The artery (Fig. 21, At) takes its origin from the truncus gonadorenalis and divides immediately into four to six branches. The testicular branches enter the parenchyma of the testes, and supply nutrition to the latter, the epididymus, and the cranial portion of the ductus deferens.

Arteria Renalis Cranialis

This arterial branch (Fig. 21, Arc) is the continuation of the truncus gonadorenalis, and courses caudally on the ventral surface of the cranial lobe of the kidney. Before entering the parenchyma of the kidney, it gives off the arteria uretodeferentiales cranialis (Fig. 21, Auc) to the ductus deferens and the ureter. The main stem of the artery enters the cranial lobe of the kidney, and divides into fine branches.
Arteriae Lumbosacralis

Aa. lumbosacralis

R. dorsalis

R. ventralis

These vessels (Fig. 22, Als) are paired, and course laterally from the descending aorta. It is difficult to separate the lumbar and sacral arteries because the lumbar and sacral vertebrae are fused to form a single bony mass. There is a complete fusion of the vertebrae of the lumbosacral region, and the segments are indicated by the intervertebral foramina through which the spinal nerves pass. There are five lumbosacral arteries present between the origin of the arteria mesenterica cranialis and the arteria ischiadica, and they may be arbitrarily called lumbar arteries. From the origin of the arteria ischiadica to the origin of the arteria pudenda communis six pairs of lumbosacral arteries arise from the lateral wall of the descending aorta, and they may be arbitrarily called sacral arteries. The first lumbar artery anastomoses with the arteria intercostalis caudalis secunda, and may give rise to the arteria suprarenalis. The lumbosacral arteries course at first laterally and then bend dorsally around the bodies of the lumbosacral vertebrae, and are concealed by the kidney. Soon each artery divides into the ramus dorsalis and the ramus ventralis.
Ramus Dorsalis

This ramus proceeds dorsally from its origin, and supplies cutaneous branches to the muscles and the skin over the dorsal aspect of the synsacrum.

Ramus Ventralis

This branch proceeds ventrolaterally, and immediately after its origin it gives off a branch which contributes in the formation of the arteria spinalis ventralis. The main stem passes onto the abdominal wall, and supplies branches to the abdominal musculature and the overlying skin.

Arteria Mesenterica Caudalis

The arteria mesenterica caudalis (Fig. 22, Amca) arises from the ventral wall of the abdominal aorta 4.2 cm caudad to the origin of the arteria ischiadica. It proceeds ventrally toward the dorsal wall of the colon, ascends cranially in the colic mesentery, and forms an arc. Six to eight branches are given off this arc which supply the colon, the colorectal junction and the rectum. Its caudal branch anastomoses with a branch of the arteria pudenda interna at the colorectal junction. Anastomosis may also be found between its cranial branch and the colic branch of the arteria iliocolica.

Arteria Pudenda Communis

A. pudenda communis

A. uretodeferentiales caudalis
A. pudenda interna
A. pudenda externa

The arteria pudenda communis (Fig. 22, Apc) is a paired vessel. The right vessel arises slightly cranially to the left vessel. It originates from the descending aorta approximately 0.8 cm caudad to the origin of the arteria mesenterica caudalis. The vessel proceeds caudolaterally on the pelvic surface of the m. depressor coccygeus, and gives off the arteria uretodeferentiales caudalis 1 cm from its origin. The main stem of the arteria pudenda communis bifurcates into the arteria pudenda interna and the arteria pudenda externa 1.5 cm from its origin.

Arteria Uretodeferentiales Caudalis

The vessel (Fig. 22, Auca) arises from the common pudendal artery 1 cm from the origin of the latter, and proceeds laterally to supply the ureter and the ductus deferens.

Arteria Pudenda Interna

This arterial branch (Fig. 22, ApI) originates from the arteria pudenda communis, and descends parallel to the ductus deferens. It gives off a branch to the colorectal junction 0.3 cm from its origin which anastomoses with the caudal branch of the arteria mesenterica caudalis. The main stem of the arteria pudenda interna continues caudally on the dorsal surface of the rectum, and supplies branches to the ductus deferens, ampulla ductus deferens, the terminal end of the ureter, the vascular body, m. dilator ani, m. suspensor ani and the m. sphincter ani.
Arteria Pudenda Externa

The arteria pudenda externa (Fig. 22, Ape) is derived from the arteria pudenda communis 1.5 cm caudad to the origin of the latter, and extends caudally on the lateral wall of the pelvic cavity. It gives off branches to the ductus deferens, ureter, m. sphincter cloacalis, m. obturatorius internus, m. cruratis caudalis, m. levator ani and the m. depressor coccygeus. Its branches may anastomose with branches of the arteria pelvina on the m. obturatorius internus.

Arteria Sacralis Mediana

Following the origin of the arteria pudenda communis sinistra, the descending aorta continues caudally as the arteria sacralis mediana (Fig. 22, Asm). The median coccygeal artery is the direct continuation of the arteria sacralis mediana.

Arteria Coccygea Mediana

This arterial branch continues caudally on the ventral aspect of the coccygeal vertebrae, and gives off five pairs of collateral coccygeal arteries. The coccygeal arteries supply the tail muscles, uropygial gland and the skin of the tail region.

Arteria Iliaca Externa

A. iliaca externa
  A. glutea cranialis
  A. pelvina
  A. circumflexa femoris
  A. femoris
Fig. 23.—Schematic illustration of the arteria iliaca externa and the arteria ischiadica. Aie, A. iliaca externa; Ai, A. ischiadica; Agc, A. glutea cranialis; Ari, A. renalis intermedius; Arc, A. renalis caudalis; Aui, A. uretodeferentiales intermedius; Ap, A. pelvina; Acf, A. circumflexa femoris; Af, A. femoris; Apf, A. profunda femoris; At, A. trochanterica; Agca, A. glutea caudalis; Anf, A. nutriciae femoris; Ap, A. poplitea; Rm, R. muscularis; Ape, A. peronealis; Rc, R. cutaneus; Afc, A. femoris caudalis; Atm, A. tibialis medialis; Atp, A. tibialis posterior; At1, A. tibialis lateralis; Ata, A. tibialis anterior; Rt, Rete tarsi; Adpe, A. dorsalis pedis; App, A. plantaris pedis; Adp, A. digitii prima; Ads, A. digitii secunda; Adt, A. digitii tertia; Adq, A. digitii quarta.
The arteria iliaca externa (Figs. 22, Aie; 23, Aie) is a paired vessel, and arises from the lateral wall of the abdominal aorta caudad to the origin of the truncus gonadorenalis. It proceeds laterally on the dorsal aspect of the kidney, and gives off the arteria glutea cranialis 0.4 cm from its origin. The arteria pelvina originates from the arteria iliaca externa 1.9 cm laterad to the origin of the arteria glutea cranialis. The main stem of the arteria iliaca externa crosses the abdominal cavity, and emerges on the medial aspect of the thigh. The artery bifurcates into the arteria circumflexa femoris and the arteria femoris 0.3 cm laterad to the origin of the arteria pelvina.

Arteria Glutea Cranialis

The arterial branch (Fig. 23, Agc) is slender, and is given off the cranial wall of the arteria iliaca externa. It accompanies the main vessel for a short distance, then turns dorsally and emerges on the dorsal surface of the ilium. It supplies nutrition to the gluteal muscles.

Arteria Pelvina

The artery (Fig. 23, Ap) is given off the caudal wall of the arteria iliaca externa 2.3 cm laterad to the origin of the latter, and courses caudally parallel to the pelvic surface of the pubic bone. It gives off a vessel near its origin which supplies the abdominal air sac. The main vessel continues caudally in the pelvic cavity, and supplies branches to the muscles on the lateral wall of the latter. It anastomoses with the arteria pudenda externa on the m. obturatorius interna.
Arteria Circumflexa Femoris

The artery (Fig. 23, Acf) arises from the arteria iliaca externa 2.6 cm laterad to the origin of the latter. It winds craniodistally, and gives off small branches to the m. sartorius and gluteal muscles. The main stem of the artery continues distally in the m. vastus intermedius, and may be followed to the knee joint. It divides into finer branches in the region of the knee joint, and supplies the m. sartorius, m. vastus intermedius, and m. rectus femoris.

Arteria Femoris

The arteria femoris (Fig. 23, Af) takes its origin from the arteria iliaca externa at the level of origin of the arteria circumflexa femoris. It courses on the lateral surface of the processus trochantericus, forms an angle of 90 degrees with the main stem and enters the femoral canal. It proceeds in the femoral canal accompanied by the femoral vein and the femoral nerve, and may be traced to the knee joint. At the level of the distal extremity of the femur it gives off the arteria genu suprema which supplies the medial aspect of the stifle joint. It anastomoses with a branch of the arteria tibialis medialis on the caudal aspect of the stifle joint, and supplies nutrition to the distal end of the m. gracilis, and the adductor muscle.

Arteria Ischiadica

A. ischiadica

A. renalis intermedius

A. renalis caudalis
Fig. 24.-- Schematic illustration of the lateral aspect of the thigh. S, M. sartorius; T, M. tensor fasciae latae; B, M. biceps femoris; SM, M. semimembranosus; ST, M. semitendinosus; G, M. gastrocnemius; P, M. peroneus longus.

Fig. 25.-- Lateral view of the thigh; m. biceps femoris and the m. tensor fasciae latae removed. S, M. sartorius; VL, M. vastus lateralis; B, M. biceps femoris; SM, M. semimembranosus; ST, M. semitendinosus; A, M. adductor; G, M. gastrocnemius; P, M. peroneus longus.

Fig. 26.-- Schematic illustration of the arteria ischiadica in the region of the thigh. Ai, A. ischiadica; S, M. sartorius; Anf, A. nutriciae femoris; QF(VL), M. vastus lateralis; Ap, A. poplitea; Rc, R. cutaneus; G, M. gastrocnemius; P, M. peroneus longus; ST, M. semitendinosus; Afc, A. femoris caudalis; SM, M. semimembranosus; QF, M. quadratus femoris; OE, M. obturatorius externa; Apf, A. profunda femoris; B, M. biceps femoris.

Fig. 27.-- Schematic illustration of the lateral view of the pelvic limb. P, M. peroneus longus; F3, M. flexor digitus perforatus et perforans to the third digit; G, M. gastrocnemius.

Fig. 28.-- Schematic illustration of the arteria poplitea; m. peroneus longus and the m. gastrocnemius removed. P, M. peroneus longus; G, M. gastrocnemius; Ape, A. peronealis; TC, M. tibialis cranialis; Ata, A. tibialis anterior; EL, M. extensor digitorum longus; Atl, A. tibialis lateralis; Atp, A. tibialis posterior; FH, M. flexor hallucis longus; Atm, A. tibialis medialis; F2, M. flexor digitus perforatus of the second digit; F3, M. flexor digitus perforatus et perforans of the third digit; Ap, A. poplitea.

Fig. 29.-- Schematic illustration of the arteria dorsalis pedis. Adp, A. dorsalis pedis; App, A. plantaris pedis; Ap, A. digitii prima; EL, M. extensor digitorum longus; As, A. digitii secundae; At, A. digitii tertia; Aq, A. digitii quarta.
A. uretodeferentiales intermedius
A. trochanterica
A. glutea caudalis
A. profunda femoris
A. nutriciae femoris
A. poplitea
R. cutaneus
A. femoris caudalis
R. muscularis
A. tibialis medialis
A. tibialis posterior
A. peronealis
A. tibialis lateralis
A. tibialis anterior
A. dorsalis pedis
A. plantaris pedis
A. digiti secunda
A. digiti prima
A. digiti tertia
A. digiti quarta

The artery (Figs. 22, Ai; 23, Ai; 26, Ai) is the main arterial supply to the pelvic limb of the turkey. It is a paired vessel, and originates from the abdominal aorta 2 cm caudad to the origin of the arteria iliaca externa. It proceeds laterally from its origin and is embedded in the caudal lobe of the kidney. The arteria renalis intermedius and the arteria renalis caudalis arise in the abdominal cavity
from the arteria ischiadica 2.2 cm laterad to the origin of the latter. The main trunk crosses the kidney and gives off the arteria trochanterica and the arteria glutea caudalis at the level of the ischiadic foramen. The ischiadic artery passes through the ischiadic foramen along with the ischiadic nerve, and courses craniodistally parallel to the femur on the lateral aspect of the m. quadratus femoris, m. adductor and m. semimembranosus. During its course in the thigh, it gives off many unnamed muscular branches which ramify in the muscles of the thigh. At the level of the middle one-third of the femur, it gives off the arteria profunda femoris and the arteria nutritia femoris. The vessel continues distally in the popliteal space, and here it receives the name arteria poplitea.

Arteria Renalis Intermedius

The artery (Fig. 23, Ari) originates from the cranial wall of the ischiadic artery 2.2 cm laterad to the origin of the latter, and proceeds cranially in the parenchyma of the intermediate lobe of the kidney. Its course in the intermediate lobe of the kidney is parallel to the course of the ductus deferens, and may be followed cranially to the level of the arteria iliaca externa. It may anastomose with the branches of the arteria renalis cranialis in the parenchyma of the kidney.

Arteria Renalis Caudalis

The artery (Fig. 23, Arc) is larger in caliber than the arteria renalis intermedius, and is derived from the arteria ischiadica at the level of origin of the former. It proceeds caudally in the parenchyma
of the caudal lobe of the kidney parallel to the course of the ductus deferens, and soon gives rise to the arteria uretodeferentialis intermedium (Fig. 23, Aui) which supplies the ureter and the ductus deferens. The main stem of the artery divides into finer branches in the caudal lobe of the kidney.

Arteria Trochanterica

The arteria trochanterica (Fig. 23, At) arises from the arteria ischiadica approximately 3.3 cm from the origin of the latter. It is a small vessel which passes to the lateral surface of the hip joint and supplies nutrition to the joint capsule, ligaments of the hip joint, m. pyriformes, the insertion of the gluteal muscles, m. obturatorius externa, m. obturatorius interna and m. gemellus.

Arteria Glutea Caudalis

This arterial branch (Fig. 23, Agca) is larger than the arteria trochanterica, and is given off the arteria ischiadica at the level of origin of the former inside the pelvic cavity. It passes through the ischiadic foramen along with the ischiadic artery, and departs from the latter soon after its exit from the foramen. The artery then proceeds distally, and gives off muscular branches to the m. obturatorius externa, gluteal muscles, m. quadratus femoris, Mm. gemelli, the proximal head of the m. adductor, and the m. biceps femoris.

Arteria Profunda Femoris

The arteria profunda femoris (Figs. 23, Apf; 26, Apf) originates from the arteria ischiadica at the level of the middle one-third of the
femur, and proceeds caudally. It gives off branches to the m. biceps femoris, m. semitendinosus and m. adductor. Some of the branches pass between the m. biceps femoris and the m. semitendinosus, and supply cutaneous branches to the skin of the thigh region. Anastomosis may be found between its cutaneous branches and the cutaneous branches of the arteria poplitea.

**Arteria Nutriciae Femoris**

The artery (Figs. 23, Anf; 26, Anf) is derived from the arteria ischiadica at the level of origin of the arteria profunda femoris. It enters the femur through the nutrient foramen, and also supplies the m. biceps femoris, m. adductor and the m. semitendinosus.

**Arteria Poplitea**

The arteria poplitea (Figs. 23, Ap; 26, Ap; 28, Ap) is the direct continuation of the arteria ischiadica in the popliteal region. It gives off a cutaneous branch, the ramus cutaneus (Figs. 23, Rc; 26, Rc) which courses between the m. biceps brachii and the m. semitendinosus, and supplies the skin in the region of the thigh. The ramus cutaneus may anastomose with the cutaneous branch of the arteria profunda femoris and with the cutaneous branch of the arteria tibialis medialis. The arteria femoris caudalis originates from the arteria poplitea slightly distad to the origin of the ramus cutaneus. The arteria poplitea gives rise to the ramus muscularis 2.2 cm distad to the origin of the arteria femoris caudalis, and at the level of the popliteal notch the arteria tibialis medialis arises. The main stem of the artery continues
distally along the caudal aspect of the tibia, and gives off the arteria tibialis posterior and the arteria peronealis at the level of the proximal interosseous space. It courses distally in the groove formed by the tibia and the fibula, and at the level of the distal interosseous space it gives off the arteria tibialis lateralis. The main stem of the artery winds through the distal interosseous space and comes to lie on the cranial surface of the distal one-third of the tibia as the arteria tibialis anterior.

Arteria Femoris Caudalis

The artery (Figs. 23, Afc; 26, Afc) takes its origin from the arteria poplitea in the popliteal space, and divides into branches. One ramus courses laterocaudally on the caudal surface of the lateral head of the m. gastrocnemius, divides into smaller branches, and supplies the m. gastrocnemius, m. biceps femoris, m. vastus lateralis and the m. tensor fasciae latae. It may anastomose with the arteria profunda femoris in the m. biceps femoris. A small cutaneous vessel ramifies the plantar surface of the lower leg.

Ramus Muscularis

This arterial branch (Fig. 23, Rm) arises from the arteria poplitea at a right angle to the long axis of the latter. It crosses the distal extremity of the femur, and bifurcates into a medial and a lateral branch. The lateral branch passes over the lateral epicondyle of the femur, and supplies nutrition to the joint capsule and the distal end of the m. semitendinosus. The medial branch courses along
the medial epicondyle, and supplies branches to the medial aspect of
the joint capsule, m. vastus medialis and m. adductor.

Arteria Tibialis Medialis

The arteria tibialis medialis (Figs. 23, Atm; 28, Atm) originates
from the arteria poplitea at the level of the popliteal notch, and
courses medially. It enters the femoral head of the gastrocnemius,
forms a cranial convex arc and may be followed to the tarsal joint.
At the level of the proximal extremity of the tibia it gives off a
small branch which anastomoses with the arteria femoris caudalis. A
cutaneous branch arises from the main stem approximately at the level
of the center of the tibia which usually anastomoses with the ramus
cutaneus. At the level of the tarsus it contributes in the formation
of the rete tarsi.

Arteria Tibialis Posterior

The artery (Figs. 23, Atp; 28, Atp) arises from the arteria popl-
itatea at the level of the proximal interosseous space present between
the tibia and the fibula. It courses distally on the caudal surface
of the tibia between the m. flexor hallucis longus and the m. flexor
digitalis profundus, and establishes a connection with the rete tarsi
at the level of the tarsus.

Arteria Peronealis

This arterial branch (Figs. 23, Ape; 28, Ape) originates from
the dorsal wall of the popliteal artery at the level of origin of the
arteria tibialis posterior. It crosses the proximal interosseous space
from the caudal to the cranial aspect of the tibia, and comes to lie between the m. flexor digiti tertii and m. peroneus on one side, and m. tibialis anterior on the other side. It supplies the m. flexor digiti tertii, m. peroneus, m. tibialis anterior and the stifle joint.

Arteria Tibialis Lateralis

The arteria tibialis lateralis (Figs. 23, Atl; 28, Atl) arises from the arteria poplitea at the level of the distal interosseous space, and runs laterocaudally in the groove between the tibia and the fibula. At the level of the tarsus it forms an arc on the plantar surface, and crosses over to the medial aspect of the tarsus. It supplies the tarsal joint, and contributes to the formation of the rete tarsi.

Arteria Tibialis Anterior

The artery (Figs. 23, Ata; 28, Ata) is the continuation of the arteria poplitea following the origin of the arteria tibialis lateralis. It crosses over the the cranial surface of the tibia, and courses on the latter under the m. peroneus and the m. tibialis anterior. At the level of the middle one-third of the tibia it gives off a muscular branch which courses between the m. peroneus and the digital flexors, and contributes to the formation of the rete tarsi. In the vicinity of the distal extremity of the tibia, it lies between the latter and the m. tibialis anterior, and gives off many branches which contribute to the formation of the rete tarsi. It crosses the tarsus by passing through an oblique tendinous loop formed by the tendons of the m.
peroneus and the m. tibialis anterior, and continues on the dorsal surface of the metatarsal bone as the arteria dorsalis pedis.

Rete Tarsi

This arterial plexus (Fig. 23, Rt) lies on the dorsal aspect of the tarsal joint in the course of the arteria tibialis anterior, and is formed by the latter, the arteria tibialis medialis, the arteria tibialis posterior and the arteria tibialis lateralis.

Arteria Dorsalis Pedis

The arteria dorsalis pedis (Figs. 23, Adpe; 29, Adp) is the direct continuation of the arteria tibialis anterior on the dorsal aspect of the metatarsal bones. It courses distally covered by the tendon of the m. extensor digitalis communis, and at the level of the proximal metaepiphysis of the metatarsal bone it gives off the arteria plantaris pedis. Immediately following the origin of the arteria plantaris pedis, the main stem of the arteria dorsalis pedis gives off the arteria digitii secunda. Collateral branches are also given off in the region of the metatarsal bone. It divides into the arteria digitii prima, arteria digitii tertia and the arteria digitii quarta at the level of the distal extremity of the metatarsal bone.

Arteria Plantaris Pedis

This arterial branch (Figs. 23, App; 29, App) arises from the arteria dorsalis pedis, and lies on the plantar surface of the metatarsals. Immediately following its origin, the artery divides into a medial and lateral branch. Both of the branches pass divergently, and
lie on the plantar surface of the metatarsals. Each vessel divides into a proximal and a distal branch; the proximal branch supplies the tarsus and contributes to the formation of the rete tarsi; the distal branch supplies the musculature and the skin on the plantar aspect of the metatarsals.

Arteria Digiti Prima

The artery (Figs. 23, Adp; 29, Ap) arises from the arteria dorsalis pedis at the level of the distal epiphysis of the metatarsals, and passes through the intercondyloid foramen. It supplies the first digit.

Arteria Digiti Secunda

The arteria digiti secunda (Figs. 23, Ads; 29, As) takes its origin from the arteria dorsalis pedis at the level of the proximal one-third of the metatarsals. It accompanies the arteria dorsalis pedis on the dorsal aspect of the metatarsals for a short distance, then diverges from the latter and proceeds toward the lateral aspect of the second digit under cover of the m. extensor digitalis communis.

Arteria Digiti Tertia

The artery (Figs. 23, Adt; 29, At) arises as a result of bifurcation of the arteria dorsalis pedis at the level of the distal epiphysis of the metatarsals, and supplies the third digit.
Arteria Digiti Quarta

This arterial branch (Figs. 23, Adq; 29, Aq) originates from the arteria dorsalis pedis as a result of bifurcation of the latter, and courses on the medial aspect of the fourth digit. It supplies nutrition to the fourth digit.

The Arteries of the Female Turkey (Meleagris gallopavo)

In the adult female turkey the internal genitalia of the left side are functional while the internal genitalia of the right side are either extremely rudimentary or absent (Fig. 31). With the exception of the following variations, the arterial system of the female turkey is similar to that of the male turkey:

1. The truncus gonadorenalis dextra (Fig. 32, Tgrd) divides into the ramus suprarenalis and the arteria renalis cranialis; the left trunk (Fig. 32, Tgrs) divides into the ramus suprarenalis, arteria renalis cranialis and the arteria ovarica.

Truncus gonadorenalis dextra

R. suprarenalis
A. renalis cranialis

Truncus gonadorenalis sinistra

R. suprarenalis
A. renalis cranialis
A. ovarica
R. oviducta
Fig. 30.—Schematic illustration of the topographic anatomy of the viscera in the female turkey. H, Heart; RL, Right lobe of the liver; LL, Left lobe of the liver; GB, Gall Bladder; G, Gizzard; SI, Small intestine; D, Duodenum; P, Pancreas; R, Rectum.
Fig. 31. -- Schematic illustration of the genital tract of the female turkey. O, Ovary; K, Kidney; I, Ilium; Cr, Right cecum; Cl, Left cecum; OD, Oviduct; C, Colon; R, Rectum.

Fig. 32. -- Schematic illustration of the arteries in the female turkey. Amc, A, mesenterica cranialis; As, A, suprarenalis; Rs, R, suprarenalis; S, Suprarenal gland; Tgrd, Truncus gonadorenalis dextra; O, Ovary; Ao, A, ovarica; Arc, A, renalis cranialis; Tgrs, Truncus gonadorenalis sinistra; Ro, R, oviducta; K, Kidney; Aie, A, iliaca externa; Ap, A, pelvina; Aoc, A, oviducta cranialis; Ai, A, ischiadica; Ari, A, renalis intermedius; Arca, A, renalis caudalis; Aoi, A, oviducta intermedius; Amca, A, mesenterica caudalis; M, Magnum; Aoca, A, oviducta caudalis; Ap, A, pudenda communis; Aos, A, sacralis mediana; Ape, A, pudenda externa; Api, A, pudenda interna; R, Rectum.
The ramus suprarenalis (Fig. 32, Rs) and the arteria renalis cranialis (Fig. 32, Arc) resembles that of the male in their course and relations.

The arteria ovarica (Fig. 32, Ao) arises from the truncus gonadorenalis sinistra and divides into branches. They proceed toward the follicular stalks and surround the ova. The main trunk of the arteria ovarica gives rise to a caudally coursing branch, the ramus oviducta which supplies the infundibulum and the cranial portion of the magnum. Usually one to two unpaired ovarian arteries are also given off the descending aorta craniad to the origin of the truncus gonadorenalis sinistra.

2. The arteria iliaca externa sinistra gives rise to the arteria oviducta cranialis 2 cm laterad to its origin in addition to the branches reported for the male turkey.

A. iliaca externa sinistra

A. glutea cranialis
A. oviducta cranialis
A. pelvina
A. circumflexa femoris
A. femoris

The arteria oviducta cranialis (Fig. 32, Aoc) originates from the arteria iliaca externa sinistra 2 cm laterad to the origin of the latter, and proceeds caudally in the mesosalpinx. It supplies branches to the magnum, and anastomoses with the arteria oviducta intermedius which is a branch of the arteria ischiadica.
3. The arteria ischiadica sinistra gives rise to the arteria oviducta intermedium at the level of origin of the arteria renalis caudalis in addition to the branches reported for the male turkey.

A. ischiadica
A. renalis intermedium
A. renalis caudalis
A. oviducta intermedium
A. trochanterica
A. glutea caudalis
A. profunda femoris
A. nutriciae femoris
A. poplitea

The arteria oviducta intermedium (Fig. 32, AoI) originates from the arteria ischiadica in the abdominal cavity. It proceeds toward the mesosalpinx, and divides into the ramus cranialis and the ramus caudalis. The ramus cranialis supplies the cranial one-half of the magnum, and may anastomose with the arteria oviducta cranialis. The ramus caudalis supplies the caudal one-half of the magnum, isthmus, uterus, and anastomoses with the arteria oviducta caudalis which is a branch of the arteria pudenda externa.

4. The arteria pudenda externa sinistra gives rise to the arteria oviducta caudalis (Fig. 32, Aoca) 0.8 cm caudad to its origin in addition to branches described for the male turkey.
Fig. 33.---Schematic illustration of the viscera. Ventral view. A, Ascending aorta; Aa, Arcus aortae; H, Heart; Li, Liver; gr.o, Greater omentum.

Fig. 34.---Schematic illustration of the viscera. Ventral view. H, Heart; Li, Liver; G, Gizzard; d, Duodenum; s, Small intestines; c, Cecum; r, Rectum; u, Uterus.

Fig. 35.---Schematic illustration of the viscera. Right lateral view. L, Lung; Li, Liver; K, Kidney; s, Small intestines; M, Mesentry; U, Uterus; d, Duodenum; G, Gizzard.

Fig. 36.---Schematic illustration of the viscera. Left lateral view. H, Heart; L, Lung; Li, Liver; O, Ovary; G, Gizzard; A, Ampulla of the oviduct; K, Kidney; s, Small intestines; c, Cecum; U, Uterus.
5. The arteria uretodeferentiales cranialis, the arteria uretodeferentiales intermedius and the arteria uretodeferentiales caudalis supply nutrition to the ureter only because the ductus deferens is absent in the females.

The Arteries of the Male Chicken (Gallus domesticus)

The aorta ascendens (Fig. 33, A) is similar to that of the turkey in the mode of origin.

Aorta

A. coronaria dextra
  R. superficialis dextra
  R. profunda dextra
A. coronaria sinistra
  R. superficialis sinistra
  Rami profunda sinistra
A. interatrialis

The coronary arteries resemble those of the turkey in their course and mode of branching.

The arcus aortae (Fig. 33, Aa) pursues a course similar to that of the turkey.

Arcus aortae

A. carotis communis
A. subclavia

There is no difference between the left and right brachiocephalic trunks in their pattern of branching.
Arteria Carotis Communis

A. carotis communis
A. thyroidea caudalis
A. bronchialis
A. esophagea ascendens
A. thyroidea cranialis
A. vertebralis communis
A. comes nervi vagi
R. muscularis
R. cutaneus
A. subcutanea colli
A. vertebralis cranialis
R. dorsalis
R. ventralis
A. vertebralis caudalis
Aa. intercostales cranialis
A. carotis externa
A. carotis interna

The arteria carotis communis (Fig. 37, Acc) has approximately the same course and termination as in the turkey. Its collateral branches present the following special features:

1. The arteria thyroidea caudalis resembles that of the turkey.
2. The arteria bronchialis (Fig. 37, Ab) arises from the dorsal wall of the arteria carotis communis at the level of origin of the arteria thyroidea caudalis. It courses caudally on the dorsal surface of
Fig. 37.—Schematic illustration of the branches of the arteria carotis communis. T, Trachea; C, Crop; Aaes, A. esophagea ascendens sinistra; Acc, A. carotis communis; As, A. subclavia; Ab, A. bronchialis; Tb, Truncus brachiocephalicus sinistra; Ascl, A. sternoclavicularis; Ac, A. coracoidea; Att, A. thyrotrachealis; Avc, A. vertebralis communis; Rm, R. muscularis; Rc, R. cutaneus; Acnv, A. comes nervi vagi; Asc, A. subcutanea colli; Rp, R. profunda; Rs, R. superficialis.

Fig. 38.—Schematic illustration of the arteria carotis externa. Aam, A. alveolaris mandibulae; Am, A. mandibularis; Ali, A. lingualis; Al, A. laryngea; As, A. sublingualis; Aed, A. esophagea descendens; Ao, A. occipitalis; Ace, A. carotis externa; Ama, A. maxillaris; Af, A. facialis; Ap, A. palatina.

Fig. 39.—Schematic illustration of the arteria carotis interna. Acn, A. cerebri nasalis; Ae, A. ethmoidea; Ra, R. aboralis; Acen, A. cerebelli nasalis; Acea, A. cerebelli aboralis; Afs, A. fossae sylvii; Ro, R. oralis; Acp, A. cerebri profunda; Aai, A. alveolaris inferior; Acc, A. carotis cerebralis; Aoe, A. ophthalmica externa; At, A. temporalis; Pt, Plexus temporalis; AcI, A. carotis interna.
the trachea, syrinx, primary bronchus and reaches the hilus of the lung. The artery also sends small branches to the esophagus which usually anastomose with the ramus esophageus of the arteria celiaca.

3. The arteria esophagea ascendens sinistra, and the arteria esophagea ascendens dextra differ in their course and distribution.

The arteria esophagea ascendens sinistra (Fig. 37, Àeas) takes its origin from the ventral wall of the arteria carotis communis at the level of the thyroid gland, and reaches the left side of the esophagus by crossing the trachea dorsally. At the level of the thyroid gland it gives rise to the arteria thyroidea cranialis. No vessel was seen to arise from the main stem of the arteria esophagea ascendens sinistra which descends caudally to supply the trachea, esophagus, syrinx, primary bronchus and the lung. Further cranially in the neck the vessel has the same course and termination as that of the turkey.

The arteria esophagea ascendens dextra (Fig. 45, Àead) is like that of the turkey.

4. The arteria vertebralis communis (Fig. 37, Àvc) arises from the arteria carotis communis at the level of the thyroid gland. It passes onto the lateral aspect of the neck, and gives rise to the arteria comes nervi vagi 0.5 cm from its origin. The artery enters the canalis transversarium and bifurcates into the arteria vertebralis cranialis and the arteria vertebralis caudalis.

The arteria vertebralis cranialis and the arteria vertebralis caudalis present no features different from those of the turkey.
The arteria comes nervi vagi (Fig. 37, Acnv) arises from the arteria vertebralis communis at the level of the thyroid gland. It courses cranially accompanied by the vagus nerve and the jugular vein. At the level of the shoulder joint it gives rise to the ramus muscularis and the ramus cutaneus. The former supplies the muscles of the shoulder region. The artery gives rise to the arteria subcutanea colli at the level of the seventh cervical vertebra. The main stem of the arteria comes nervi vagi continues cranially, and anastomoses with the ramus superficialis of the arteria occipitalis.

The arteria lateralis is absent in the chicken, instead, the area supplied by the arteria lateralis in the turkey, is supplied by the branches of the arteria comes nervi vagi (Ramus muscularis and the Ramus cutaneus) in the chicken.

The arteria subcutanea colli (Fig. 37, Asc) is like that of the turkey with the exception of its origin. In the case of turkey the artery arises from the arteria carotis communis, but in the case of chicken it arises from the arteria comes nervi vagi.

5. Arteria Carotis Externa

A. carotis externa

A. occipitalis

R. superficialis

R. profunda

R. occipitalis

A. esophagea descendens

A. sublingualis
A. hyoidea
R. laryngeus
A. laryngea
A. lingualis
A. mandibularis
A. alveolaris mandibulae
A. palatina
A. maxillaris
A. auricularis
A. pterygoidea
A. facialis

The arteria carotis externa (Fig. 38, Ace) arises as a result of bifurcation of the arteria carotis communis at the level of the atlas. In one cockerel the arteria occipitalis arose from the arteria carotis communis just caudal to the bifurcation of the latter. The arteria carotis externa resembles that of the turkey in its course, distribution and relations.

6. Arteria Carotis Interna

A. carotis interna

A. ophthalmica externa

Plexus temporalis

A. temporalis

A. alveolaris inferior

A. centralis retinæ
A. sphenoidae
A. sphenomaxillaris
A. carotis cerebralis
A. ophthalmica interna
R. oralis
A. fossae sylvii
A. ethmoidea
A. cerebri nasalis
R. aboralis
A. cerebri profunda
Aa. cerebelli nasalis
A. basilaris cerebri
A. cerebelli aboralis

The arteria carotis interna (Fig. 39, AcI) has the same basic pattern of branching and relations as that of the turkey.

Arteria Subclavia

The left and right subclavian arteries resemble each other in their course, pattern of branching and relations.

A. subclavia
A. thyrotrachealis
R. thyroideus
R. trachealis
A. sternoclavicularis
A. sternalis
A. clavicularis
A. acromialis
A. axillaris
A. thoracica communis

The arteria subclavia (Fig. 37, As) is a large vessel which courses craniodorsally and laterally. It gives rise to the arteria thyrotrachealis following the origin of the arteria carotis communis. The arteria sternoclavicularis and the arteria acromialis arise from the arteria subclavia 0.5 cm laterad to the origin of the arteria thyrotrachealis. The artery continues laterally and gives rise to the arteria axillaris. Following the origin of the arteria axillaris the main stem of the arteria subclavia continues laterally as the arteria thoracica communis.

The arteria thyrotrachealis (Fig. 37, Att) pursues a course similar to that of the turkey, and has the same basic pattern of branching.

The arteria sternoclavicularis (Fig. 37, Ascl) proceeds ventromedially and reaches the caudal one-third of the coracoid bone. Here it gives rise to a branch which courses dorsad to the coracoid bone and enters the thoracic cavity. The main stem of the artery crosses the coracoid bone medially and courses between the latter and the m. coracobrachialis in the direction of the processus medianus sterni. At the level of this process it divides into the arteria sternalis and the arteria clavicularis.

The arteria sternalis enters the m. supracoracoideus, passes caudally to reach the crista sterni, and curves ventrally to supply the m. pectoralis superficialis.
Fig. 40.-- Schematic illustration of the arteria thoracica communis. Atel, A. thoracica externa lateralis; Atev, A. thoracica externa ventralis; Ated, A. thoracica externa dorsalis; S, Skin; PS, M. pectoralis superficialis; PP, M. pectoralis profundus; C, Crop; Acc, A. carotis communis; Att, A. thyrotrachealis; Aa, A. axillaris; Ati, A. thoracica interna; Asc, A. sternoclavicularis; H, Heart; L, Liver; G, Gizzard; D, Duodenum.
Fig. 41.—Schematic illustration of the arteries of the wing. Asu, A. subscapularis; Ac, A. coracoidea; Aa, A. axillaris; As, A. subclavia; Apb, A. profunda brachii; Acu, A. collateralis ulnaris; Aru, A. recurrens ulnaris; Rf, R. folliculus; Amt, A. metacarpea tertia; Amq, A. metacarpea quarta; Ai, A. indicis; Ar, A. radialis; Arr, A. recurrens radialis; Rm, R. muscularis; Acr, A. collateralis radialis; Ach, A. circumflexa humeralis; Ab, A. brachialis.
The arteria clavicularis curves cranially and courses parallel to the furcula in the direction of the shoulder joint. It supplies branches to the m. supracoracoideus and the m. pectoralis superficialis.

The arteria acromialis (Fig. 37, Ac) arises from the ventral wall of the arteria subclavia at the level of origin of the arteria sternoclavicularis. It has the same course and relations as that of the turkey.

Arteria Thoracica Communis

A. thoracica communis
  A. thoracica interna
    R. dorsalis
    R. ventralis
  A. thoracica externa communis
    A. thoracica externa ventralis
      A. subcutanea thoracica
    A. thoracica externa dorsalis
  A. thoracica externa lateralis
    A. thoracica externa lateralis cranialis
    A. thoracica externa lateralis caudalis

The arteria thoracica communis (Fig. 40) pursues a course similar to that of the turkey and has the same basic pattern of branching and relations. It presents no feature different from that of the turkey.
Arteria Axillaris

A. axillaris

A. subscapularis
A. coracoidea
A. profunda brachii

R. muscularis
A. nutrientiae humeralis
A. collateralis ulnaris
A. collateralis radialis
A. brachialis
A. circumflexa humeralis
A. radialis

R. muscularis
A. recurrents radialis

Rami folliculi
A. ulnaris
A. recurrents ulnaris
A. indicis
A. metacarpea tertia
A. metacarpea quarta

The arteria axillaris (Fig. 41, Aa) pursues a similar course and has the same relations and termination as in the turkey.
Fig. 42.-- Schematic illustration of the arteria celiaca. Ace, A. celiaca; Agd, A. gastrica dextra; Al, A. lienalis; Ahd, A. hepatica dextra; GB, Gall Bladder; Aics, A. iliocecalis sinistra; Agdo, A. gastrica dorsalis; Apd, A. pancreaticoduodenalis; Rv, R. ventralis; Rd, R. dorsalis; Ri, R. intermedius; Ahs, A. hepatica sinistra; S, Spleen; O, Ovary; Ags, A. gastrica sinistra; Aps, A. proventriculus secunda; App, A. proventriculus prima; Re, R. esophageus.
Fig. 43. -- Schematic illustration of the branches of the descending aorta. A, Aorta; App, A. proventriculus prima; Amc, A. mesenterica cranialis; As, A. suprarenalis; S, Suprarenal gland; Tgr, Truncus gonadorenalis; Rs, R. suprarenalis; At, A. testicularis; Arcr, A. renalis cranialis; Auc, A. uretodeferentiales cranialis; Ur, Ureter; Aie, A. iliaca externa; Ari, A. renalis intermedianus; Al, A. ischiadica; Aui, A. uretodeferentiales intermedium; Arc, A. renalis caudalis; Al, A. lumbosacralis; Dd, Ductus deferens; Auca, A. uretodeferentiales caudalis; Apc, A. pudenda communis; Apí, A. pudenda interna; Acm, A. coccygea mediana; Re, R. cloacalis; Ape, A. pudenda externa; Amca, A. mesenterica caudalis; Apd, A. pancreaticoduodenalis; Li, Liver; S, Spleen; Agd, A. gastrica dextra; Ags, A. gastrica sinistra; Re, R. esophageus.
Aorta Descendens

Aorta descendens

Aa. intercostales caudalis, prima et secunda (Paired)
A. celiaca (Unpaired)
A. mesenterica cranialis (Unpaired)
A. suprarenalis (Paired)
Truncus gonadorenalis (Paired)
A. iliaca externa (Paired)
A. ischiadica (Paired)
Aa. lumbosacralis (Paired)
A. mesenterica caudalis (Unpaired)
A. pudenda communis (Paired)
A. sacralis mediana (Unpaired)

The aorta descendens (Fig. 43, A) pursues a course similar to that of the turkey, and has the same basic pattern of branching.

Arteriae Intercostales Caudalis

Aa. intercostales caudalis
R. dorsalis
R. ventralis

These arterial branches have the same course, termination and relations as in the turkey.
Arteria Celiaca

A. celiaca

R. esophageus
A. proventriculus prima
A. proventriculus secunda
A. gastrica sinistra
R. proventriculus
A. hepatica sinistra
R. dorsalis
R. intermedius
R. ventralis
A. gastrica dextra
Aa. lienalis
A. hepatica dextra
R. duodenalis
A. cystica
A. gastrica dorsalis
A. pancreaticoduodenalis
Aa. iliocecalis sinistra

The arteria celiaca (Fig. 42, Ace) is an unpaired vessel which arises from the right lateral wall of the descending aorta and pursues a course similar to that of the turkey. The chief differences in its branching are as follows:

1. The arteria gastrica sinistra (Figs. 42, Ags; 43, Ags) gives off one to three rami proventriculus. At the junction of the
proventriculus and the ventriculus it divides in a star-shaped fashion, and the following branches were recognized:

1) A. hepatica sinistra
2) R. dorsalis
3) R. intermedius
4) R. ventralis

The arteria hepatica sinistra, ramus dorsalis and the ramus ventralis resemble those of the turkey in their course and relations.

The ramus intermedius arises from the arteria gastrica sinistra on the ventral surface of the isthmus of the ventriculus. It divides in a fan-shaped fashion and supplies branches to the musculature of the ventriculus.

In one cockerel two more branches were observed emerging out of the star-shaped division of the arteria gastrica sinistra. One branch coursed recurrently on the ventral surface of the proventriculus, and the other branch supplied the pyloris.

2. The arteria gastrica dextra (Figs. 42, Agd; 43, Agd) courses caudo-ventrally from the bifurcation of the arteria celiaca. It gives off two to three arteriae lienalis at the level of the spleen. At the level of the hilus of the liver it gives rise to the arteria hepatica dextra. The main vessel continues caudally and gives rise to the arteria gastrica dorsalis at the level of the caudal border of the ventriculus. The vessel enters the loop of the duodenum as the arteria pancreaticoduodenalis.

The arteriae lienalis (Fig. 42, Al) are two to three in number, and are given off the arteria gastrica dextra at the level of the spleen.
The arteria hepatica dextra (Fig. 42, Ahd) is like that of the turkey.

The arteria gastrica dorsalis (Fig. 42, Agdo) courses to the left and reaches the right surface of the ventriculus. It supplies branches to the right dorsal surface of the ventriculus and pyloris, and anastomoses with the ramus dorsalis.

The arteria pancreaticoduodenalis (Fig. 42, Apd) is similar in its course and termination to that of the turkey with the exception of the arteriae iliocecalis sinistra (Fig. 42, Aics) which are also given off the arteria pancreaticoduodenalis in the chicken.

The first iliocecal artery arises at the level of the cranial one-third of the duodenal loop. It reaches the ilium which is flanked on either side by the two ceca, and supplies branches to both. It anastomoses with the branches of the arteria mesenterica cranialis. The second iliocecal artery arises from the arteria pancreaticoduodenalis at the level of the distal one-fourth of the duodenal loop. It reaches the ilium and the ceca near the free ends of the latter, and supplies branches to both.

Arteria Mesenterica Cranialis

A. mesenterica cranialis

A. iliocolica

A. iliocecalis dextra

Ramus ilei

Rami cecalis

A. jejunoduodenalis
Aa. jejunalis

Aa. ilei

The arteria mesenterica cranialis (Figs. 43, Amc; 44, Amc) pursues a course similar to that of the turkey. Its collateral branches present the following features:

1. The arteria iliocolica, arteria jejunoduodenalis, arteriae jejunalis and the arteriae ilei resemble in arrangement of their branches that of the turkey.

2. The arteria iliocecalis dextra (Fig. 44, Aicd) arises at the level of origin of the ceca, and courses one to two centimeters toward the iliocecal junction to divide into the ramus ilei and the rami cecalis.

The ramus ilei (Fig. 44, Ri) supplies the ilium but sometimes its branches may be traced in the adjoining portions of the ceca.

The rami cecalis (Fig. 44, Rc) supply branches mainly to the ceca, but branches to the ilium were also observed.

The arteria suprarenalis of the chicken is similar to that of the turkey.

Truncus Gonadorenalis

Truncus gonadorenalis

R. suprarenalis

A. testicularis

A. renalis cranialis

A. uretodeferentiales cranialis
Fig. 44. -- Schematic illustration of the arteria mesenterica cranialis. Ao, Aorta; Amc, A. mesenterica cranialis; Aicd, A. iliocecalis dextra; Ri, R. ilei; Aico, A. iliocolica; K, Kidney; Amca, A. mesenterica caudalis; Rca, R. caudalis; Rcr, R. cranialis; Cl, Cloaca; U, Uterus; Rc, R. cecalis; Aj, A. jejunalis; Aics, A. iliocecalis sinistra; Rd, R. duodenalis; Ac, A. celiaca.
Fig. 45.---Schematic illustration of the branches of the descending aorta. Aead, A. esophagea ascendens dextra; Acc, A. carotis communis; As, A. subclavia; B, Truncus brachiocephalicus; A, Aorta; Aj, A. jejunalis; Aicd, A. iliocecalis dextra; Ri, R. ilei; Rc, R. cecalis; Aico, A. iliocolica; Amca, A. mesenterica caudalis; ApC, A. pudenda communis; Api, A. pudenda interna; Rs, R. suprarenalis; Arc, A. renalis cranialis; Aie, A. iliaca externa; Ari, A. renalis intermedius; Arca, A. renalis caudalis; Aoca, A. oviducta caudalis; U, Uterus; Ape, A. pudenda externa; Aoi, A. oviducta intermedius; Aoc, A. oviducta cranialis; Ro, R. oviducta; Ao, A. ovarica; Tgr, Truncus gonadorenalis; Ac, A. celiaca; Re, R. esophageus; Am, Ampulla of the oviduct; L, Lung, O, Ovary; H, Heart, C, Crop.
Fig. 46.—Schematic illustration of the arteries of the pelvic limb. Ai, A. ischiadica; Arc, A. renalis caudalis; Agc, A. glutea caudalis; Ari, A. renalis intermedius; At, A. trochanterica; Apf, A. profunda femoris; Rc, R. cutaneus; Af, A. femoris caudalis; Atm, A. tibialis medialis; Atp, A. tibialis posterior; Atl, A. tibialis lateralis; App, A. plantaris pedis; Adp, A. digitii prima; Ads, A. digitii secunda; Adt, A. digitii tertia; Adq, A. digitii quarta; Adpe, A. dorsalis pedis; Rt, Rete tarsi; Ata, A. tibialis anterior; Ape, A. peronealis; Rm, R. muscularis; Ap, A. poplitea; Anf, A. nutriciae femoris; Af, A. femoris; Acf, A. circumflexa femoris; Agcr, A. glutea cranialis; Apn, A. pelvina; Aie, A. iliaca externa.
The truncus gonadorenalis (Fig. 43, Tgr) has the same basic pattern of branching as that of the turkey, and presents no special feature.

Arteriae Lumbosacralis

Aa. lumbosacralis
R. dorsalis
R. ventralis

The arteriae lumbosacralis present no feature different from those of the turkey.

Arteria Mesenterica Caudalis

A. mesenterica caudalis
R. cranialis
R. caudalis

The artery (Fig. 44, Amca) arises from the descending aorta two to three millimeters cranial to the origin of the arteria pudenda communis. In one hen it originated along with the arteria pudenda communis by a common trunk from the descending aorta. This artery courses in the colic mesentry, and divides into the ramus cranialis and the ramus caudalis.

The ramus cranialis (Fig. 44, Rcr) ascends cranially and supplies branches to the colon. It anastomoses with a branch of the arteria iliocolica.
The ramus caudalis (Fig. 44, Rca) descends caudally on the colon and the rectum, and supplies branches to both. It anastomoses with a branch of the arteria pudenda interna.

Arteria Pudenda Communis

A. Pudenda communis
   A. uretodeferentiales caudalis
   A. pudenda externa
   A. pudenda interna

   The arteria pudenda communis (Fig. 43, Apc) resembles that of the turkey in its course, collateral branches, relations and termination.

   The arteria sacralis mediana, arteria coccygea mediana and the arteria collateralis coccygea resemble those of the turkey in their relations, course and termination.

Arteria Iliaca Externa

A. iliaca externa
   A. glutea cranialis
   A. pelvina
   A. circumflexa femoris
   A. femoris

   The arteria iliaca externa (Fig. 46, Aie) has the same course, collateral branches, relations and termination as that of the turkey.
Arteria Ischiadica

A. Ischiadica
  A. renalis intermedius
  A. renalis caudalis
    A. uretodeferentiales intermedius
  A. trochanterica
  A. glutea caudalis
  A. profunda femoris
  A. nutriciae femoris
  A. poplitea
    R. cutaneus
      A. femoris caudalis
    R. muscularis
      A. tibialis medialis
      A. tibialis posterior
      A. peronealis
      A. tibialis lateralis
      A. tibialis anterior
      A. dorsalis pedis
        A. plantaris pedis
      A. digitii secunda
      A. digitii prima
      A. digitii tertia
      A. digitii quarta
The arteria ischiadica (Fig. 46, A1) pursues a similar course and presents the same basic pattern of branching as that of the turkey.

The Arteries of the Female Chicken (Gallus domesticus)

The sexual manifestations of the hen are similar to that of the female turkey. In the adult female the genitalia of the left side are functional. The arteries in the hen (Fig. 45) are arranged as in the female turkey.

The Arteries of the Male Goose (Anser anser)

Aorta

The aorta (Fig. 47, A) begins its course at the base of the left ventricle between the left atrioventricular valve and the ventricular septum. It proceeds cranially and slightly to the right inclining somewhat dorsally. The vessel leaves the base of heart caudally and somewhat to the right of the pulmonary artery, ascending cranially and slightly to the right up to the level of first thoracic vertebra. It gives off the truncus brachiocephalicus sinistra 1 cm cranial to its root. The main trunk proceeds craniodorsally to the right for a distance of 0.4 cm and gives off the truncus brachiocephalicus dextra. The portion of the aorta which is present between the base of the left ventricle and the origin of the left brachiocephalic trunk is called the ascending aorta and is 1 cm in length. The ascending aorta curves dorsocaudally and slightly to the right forming the arcus aortae. From the level of the third thoracic vertebra the aorta passes caudally through the thorax into the abdominal and pelvic cavities. At the level
Fig. 47.—Schematic illustration of the topographic anatomy of the viscera. T, Trachea; B, Truncus brachiocephalicus; Ao, Aorta; H, Heart; L, Lung; Li, Liver; A, Abdominal cavity; P, Pancreas; D, Duodenum; G, Gizzard; R, Rectum; CL, Cloaca; S, Skin.
of the 12th segment of the synsacrum it divides into the arteria pudenda communis sinistra, arteria pudenda communis dextra and the arteria sacralis mediana.

Aorta Ascendens

Aorta ascendens

A. coronaria dextra

R. superficialis dextra

R. atrialis

R. ventricularis

R. profunda dextra

R. proximalis

R. distalis

A. coronaria sinistra

R. profunda sinistra

R. superficialis sinistra

R. proximalis

R. distalis

The aorta ascendens is (Fig. 47, A) invested with a fibrous pericardium and shares a serous reflection with the pulmonary trunk. It ascends in the anterior mediastinum craniadorsally to the right up to the level of first thoracic vertebra. The root of the aorta is dilated because of the presence of three bulgings, the aortic sinuses. Each sinus is related to the cusp of the aortic valve. The ligamentum arteriosum was found only in one female goose. It was a weak fibrous
band connecting the aorta and the right pulmonary artery. At the level of its root the ascending aorta gives rise to the arteria coronaria dextra and the arteria coronaria sinistra.

The coronary arteries were distributed almost entirely in the heart. Branches were dispatched to the roots of the great vessels and pericardium. They anastomosed freely in the parenchyma of the heart.

Arteria Coronaria Dextra

The arteria coronaria dextra arises from the ventral aortic sinus. It soon divides into the Ramus superficialis dextra and the ramus profunda dextra.

Ramus Superficialis Dextra

The artery proceeds craniocaudally between the right auricle and the conus arteriosus. At the level of the coronary sulcus it bifurcates into a smaller and a larger subdivision. The smaller subdivision courses to the left and supplies the upper portion of the left ventricular wall. The larger subdivision is the direct continuation of the ramus superficialis dextra. It follows a flexuous course in the right coronary sulcus and proceeds toward the upper part of the right longitudinal sulcus. The vessel gives off branches to the right atrium, right atrioventricular valve and right ventricular wall. It terminates by dividing into atrial and ventricular branches. The atrial branches anastomose with the atrial branches of the Ramus superficialis sinistra (intercoronary anastomosis), and the terminal ventricular branches frequently anastomose with the branches of the Ramus profunda dextra (homocoronary anastomosis).
Ramus Profunda Dextra

The ramus profunda dextra is larger than the ramus superficialis dextra and curves on the right face of the interventricular septum. During its course it travels in the subendocardium and divides into the ramus proximalis and the ramus distalis at the level of the furrow present between the interventricular septum and the root of the aorta. Before dividing, the vessel gives off a small branch to the right atrioventricular muscular cusp. The septal branch usually forms an anastomosis with a similar branch of the ramus profunda sinistra.

Ramus Proximalis

The ramus proximalis curves on the right upper one-third of the interventricular septum and then proceeds to the dorsal wall of the left ventricle. Its terminal branches do not reach the apex of the heart but supply branches to the interventricular septum and dorsal part of the left ventricular wall.

Ramus Distalis

The ramus distalis courses toward the apex of the heart. Coursing on the right ventral face of the interventricular septum it divides into three terminal branches; one branch passes to the left ventricular wall constituting the major supply to the apex of the heart; and the other two branches supply the interventricular septum.

Arteria Coronaria Sinistra

The arteria coronaria sinistra arises from the left aortic sinus, curves to the left and proceeds ventrally toward the upper border of the left ventricle near the conus arteriosus. At this level it gives
off a deep branch, the ramus profunda sinistra, and the main trunk continues as the ramus superficialis sinistra. Interatrial branches and branches to the left side of the conus arteriosus are given off which supply the root of the aorta, the root of the pulmonary artery, the left atrium, the interatrial septum, and the conus arteriosus.

Ramus Profunda Sinistra

The ramus profunda sinistra takes its origin from the main trunk behind the conus arteriosus passing ventrally on the left face of the interventricular septum. At this level it enters the left dorsal ventricular wall, and gives off branches which anastomose with the branches of the right deep coronary artery (intercoronary anastomosis). A few branches turn dorsally in the ventral longitudinal sulcus which enter the right ventricular wall. Septal branches are also given off which anastomose with the septal branches of the right deep coronary artery.

Ramus Superficialis Sinistra

The ramus superficialis sinistra continues as the main trunk coursing in the left coronary sulcus and bifurcates into the ramus proximalis and the ramus distalis on the dorsal aspect of heart. The proximal ramus provides branches for the right atrium and sinus venosus. Homocoronary anastomosis between the proximal and the distal rami, and between the superficial ramus and deep ramus are present. The distal ramus turns onto the left ventricular wall and supplies branches to it. Homocoronary and intercoronary anastomoses were found with the distal ramus as one of the partners.
Arcus Aortae

Arcus aortae

Truncus brachiocephalicus sinistra et dextra

A. carotis communis

A. subclavia

The roots of the right and the left brachiocephalic trunks along with the ascending aorta are ensheathed by the extension of the pericardium and fat. The truncus brachiocephalicus sinistra (Fig. 48, B) is given off the arcus aortae 1 cm cranial to the root of the aorta, and the truncus brachiocephalicus dextra (Fig. 47, B) takes its origin from the arcus aortae 0.4 cm cranial to the origin of the left trunk. The left trunk proceeds craniodorsally to the left and forms an angle of 100 to 110 degrees with the ascending aorta. The right trunk proceeds craniodorsally to the right and forms an angle of 45 to 50 degrees with the arcus aortae. Both the brachiocephalic trunks have similar patterns of branching and ramification. The arteria carotis communis is given off the brachiocephalic trunk 3 cm laterad to the origin of the latter. Following the origin of the arteria carotis communis, the brachiocephalic trunk continues laterally as the arteria subclavia (Fig. 48).

Arteria Carotis Communis

A. Carotis communis

A. thyrobronchialis

R. trachealis

R. thyroideus
Fig. 48.—Schematic illustration of the arteria carotis communis. Acc, A. carotis communis; B, Truncus brachiocephalicus; S, Syrinx; E, Esophagus; Atb, A. thyrobronchialis; T, Trachea; rt, R. thyroideus; rf, R. fascialis; rb, R. bronchialis; rth, R. trachealis; As, A. subclavia; L, Lung;

Fig. 49.—Schematic illustration of the branches of the arteria carotis communis. T, Trachea; Aea, A. esophagea ascendens; Acc, A. carotis communis; S, Syrinx; E, Esophagus; Rc, R. cutaneus; Acnv, A. comes nervi vagi; Avco, A. vertebralis communis; Atca, A. thyroidea caudalis; Atb, A. thyrobronchialis;

Fig. 50.—Schematic illustration of the branches of the arteria carotis communis. Al, A. laryngea; T, Trachea; Aea, A. esophagea ascendens; E, Esophagus; Aed, A. esophagea descendens; Ace, A. carotis externa; Aci, A. carotis interna; Asc, A. subcutanea colli; Sk, Skin; Acc, A. carotis communis.
R. bronchialis
R. fascialis
A. comes nervi vagi
   A. thyroidea caudalis
   A. esophagea ascendens
      A. thyroidea cranialis
   A. lateralis
      R. muscularis
      R. cutaneus
      R. cranialis
A. vertebralis communis
   A. vertebralis cranialis
      R. dorsalis
      R. ventralis
A. vertebralis caudalis
   A. intercostalis cranialis prima et secunda
      R. dorsalis
      R. ventralis
R. cutaneus
A. subcutanea colli
   R. cranialis
   R. caudalis
A. carotis externa
A. carotis interna
The arteria carotis communis (Figs. 48, Acc; 49, Acc; 50, Acc) is the major arterial supply to the head and neck. It takes its origin from the cranial wall of the brachiocephalic trunk 0.75 cm mediad to the origin of the arteria sternoclavicularis and 3 cm laterad to the origin of brachiocephalic trunk. It proceeds cranially and crosses the m. sternotrachealis dorsally. It gives off the arteria thyrobronchialis 1.0 cm craniad to its origin. The arteria comes nervi vagi, ramus cutaneus and the arteria vertebralis communis are given off at the level of the thyroid gland. The main trunk of the arteria carotis communis continues cranially and shifts from the lateral aspect of the neck to the ventromedial aspect. It courses convergently toward the midline of the neck, and at the level of the 11th cervical vertebra it comes to lie aside the opposite common carotid artery. The artery is located ventral to the m. longus colli from the 11th cervical vertebra to the 8th cervical vertebra; then it pierces the m. longus colli and comes to lie on the ventral surface of the bodies of the 5th to 8th cervical vertebra. It courses partly embedded in the m. longus colli from the 5th to the 2nd cervical vertebra. The artery begins diverging from the common carotid artery of the opposite side at the level of the 4th cervical vertebra and emerges completely from the m. longus colli at the level of the 2nd cervical vertebra. Here it gives rise to the arteria subcutanea colli. The main trunk supplies many unnamed branches to the m. longus colli, m. intertransversalis, m. multifidis cervicis, m. biventer cervicis and m. trachelomastoideus. It divides into the arteria carotis externa and the arteria carotis interna 1.0 cm craniad to the origin of the arteria subcutanea colli.
Arteria Thyrobronchialis

This artery (Fig. 48, Atb; 49, Atb) originates from the lateral wall of the arteria carotis communis and proceeds laterally for 0.5 cm. It divides into the ramus trachealis, ramus thyroideus, ramus bronchialis and the ramus fascialis.

Ramus Trachealis

This vessel (Fig. 48, rth) proceeds medially from its origin and supplies branches to the syrinx and lower adjoining portion of the trachea. It anastomoses with the tracheal branches of the arteria esophagea ascendens.

Ramus Thyroideus

The thyroid gland is present on the lateral aspect of the neck 2 cm cranial to the origin of common carotid artery. The ramus thyroideus (Fig. 48, rt) courses cranially along with the main trunk of the common carotid artery for 1.5 cm and enters the caudoventral border of the thyroid gland at the level of the 12th cervical vertebra. It supplies branches to the thyroid gland.

Ramus Bronchialis

This arterial branch (Fig. 48, rb) proceeds caudally from its origin and courses on the visceral surface of the lung. Near the hilus of the lung it proceeds on the primary bronchus and reaches the hilus. It also sends branches to the esophagus and anastomoses with the branches of the arteria proventriculus.
Ramus Fascialis

This branch (Fig. 48, rf) courses toward the fascia enclosing the jugular vein and vagosympathetic trunk. It proceeds laterally and rami- fies in the adjacent fascia.

Arteria Comes Nervi Vagi

This artery (Fig. 49, Acnv) takes its origin from the lateral wall of the common carotid artery at the level of thyroid gland. Its root is located 0.5 cm cranial to the origin of the arteria thyrobronchialis. It proceeds cranially and somewhat laterally giving rise to the arteria thyroidea caudalis, close to its origin. One-half centimeter cranial to the origin of the arteria thyroidea caudalis it gives rise to the arteria esophagea ascendens. The main trunk proceeds cranially accompanied by the vagosympathetic trunk and the jugular vein. It divides into the arteria lateralis and the ramus cranialis 7 cm cranial to the origin of the arteria esophagea ascendens.

Arteria Thyroidea Caudalis

This artery (Fig. 49, Atca) originates from the medial wall of the arteria comes nervi vagi at the level of thyroid gland and 0.5 cm caudad to the origin of arteria esophagea ascendens. It proceeds medially from its origin and enters the thyroid gland.

Arteria Esophagea Ascendens

The course adopted by the arteria esophagea ascendens of the right and left side differs, therefore, the distribution of each artery is described separately.
Arteria Esophagea Ascendens Sinistra

The arteria esophagea ascendens sinistra (Fig. 49, Aea; 50, Aea) arises from the arteria comes nervi vagi 0.5 cm craniad to the origin of the arteria thyroidea caudalis. Near its origin it gives rise to the arteria thyroidea cranialis. It proceeds mediocranially, crosses the trachea and comes to lie between the esophagus and trachea. The main trunk continues cranially and may be traced to the caudal border of the mandible. The vessel supplies branches to the trachea and esophagus, and anastomoses with the branches of the arteria esophagea descendens and arteria laryngea on the esophagus and trachea respectively.

Arteria Thyroidea Cranialis

This vessel (Fig. 49, Atc) originates from the arteria esophagea ascendens and is located 0.33 cm craniomedial to the origin of the latter. It proceeds caudally and enters the thyroid gland.

Arteria Esophagea Ascendens Dextra

The initial course and distribution of this vessel is the same as that of the arteria esophagea ascendens sinistra. It does not cross the trachea but remains confined to the right side of esophagus and may be traced on the esophagus 6 cm cranial to the level of the thyroid gland. It supplies branches to the thyroid gland and esophagus, and anastomoses with the branches of the arteria esophagea ascendens sinistra.

Arteria Lateralis

This arterial branch proceeds laterally and divides into the ramus muscularis and the ramus cutaneus at the level of the shoulder joint.
Ramus Muscularis

This artery supplies branches to the m. cutaneus cleidodorsalis and the m. cutaneus spinalis dorsalis.

Ramus Cutaneus

This arterial branch proceeds cranially from its origin and supplies branches to the skin and feathers of the neck.

Ramus Cranialis

The ramus cranialis (Fig. 49, Rc) courses cranially and bifurcates at a distance of 1.5 cm from its origin. Both the branches course cranially at an angle of 30 degrees and supply branches to the m. cutaneus colli lateralis, m. cutaneus nuchalis, m. ypsilotrachealis, m. sterno-thyrohyoideus, and skin of the cervical region. It anastomoses with the descending branch of the arteria subcutanea colli.

Arteria Vertebralis Communis

The arteria vertebralis communis (Fig. 49, Avco) is a well developed branch and takes its origin from the dorsolateral wall of the arteria carotis communis at the level of the thyroid gland. It proceeds laterally to the lateral side of the neck and enters the foramen transversarium at the level of 12th cervical vertebra. It bifurcates upon entering the foramen transversarium into the arteria vertebralis cranialis and the arteria vertebralis caudalis.

Arteria Vertebralis Cranialis

This vessel (Figs. 51, Avc; and 52, Avc) proceeds towards the head in the canalis transversarium and may be traced cranially to the level
of the second cervical vertebra. During its course from the 12th to the 2nd cervical vertebra it gives off dorsal and ventral branches at each intervertebral space. The dorsal branches pass through the foramina transversarium and supply branches to the m. trachelomastoid, m. rectus capitis lateralis, m. interspinalis, m. semispinalis capitis and m. biventer cervicis. The ventral branches also pass through the foramina transversarium and supply the m. multifidis cervicis, m. intertransversalis and m. longus colli. At the level of the wing of the atlas it divides into the ramus dorsalis and the ramus ventralis.

Ramus Dorsalis

This arterial branch courses craniolaterally and supplies branches to the m. rectus capitis dorsalis major, m. semispinalis and m. complexus.

Ramus Ventralis

This vessel proceeds medially and supplies branches to the m. rectus capitis ventralis. It anastomoses with the ramus profunda of the arteria occipitalis.

Arteria Vertebralis Caudalis

The artery descends caudally through the foramen transversarium of the 13th cervical vertebra and proceeds along the 1st to 3rd articulatio costovertebralis. It gives off two intercostal arteries in the first and the second intercostal space. The vessel may be traced to the third articulatio costovertebralis and here it anastomoses with branches of the third intercostal artery which is an aortic branch.
Arteria Intercostalis Cranialis Prima

The arteria intercostalis cranialis prima originates from the arteria vertebralis caudalis at the level of the first intercostal space. It divides into the ramus dorsalis and the ramus ventralis at the level of first articulatio costovertebralis.

Ramus Dorsalis

The ramus dorsalis supplies branches to the dorsal musculature and the skin overlying the thoracic vertebrae. It also sends a branch in the vertebral canal which contributes to the formation of the arteria spinalis ventralis.

Ramus Ventralis

The ramus ventralis courses in the first intercostal space close to the caudal border of the first rib. It supplies branches to the Mm. intercostales externi, Mm. intercostales interni and Mm. intertrasversalis. It anastomoses with branches of the arteria thoracica interna and ventral ramus of the arteria intercostalis cranialis secunda.

Arteria Intercostalis Cranialis Secunda

This artery originates from the arteria vertebralis caudalis at the level of the second intercostal space. Its course and mode of ramification is similar to that of the arteria intercostalis cranialis prima. It anastomoses with the branches of the arteria thoracica interna, arteria intercostalis cranialis prima and arteria intercostalis caudalis prima.
Ramus Cutaneus

The ramus cutaneus (Fig. 49, Rc) is given off the arteria carotis communis at the level of origin of the arteria vertebralis communis, and proceeds cranially and somewhat dorsally. It may be traced in the skin to the level of the 4th cervical vertebra, and supplies branches to the M. ypsilotrachealis, m. sternothyrohyoideus, m. cutaneus colli, and skin of the cervical region.

Arteria Subcutanea Colli

This artery (Fig. 50, Asc) originates from the arteria carotis communis at the level of the second cervical vertebra and 4 cm cranial to the divergence of the arteria carotis communis. It proceeds laterally for 0.75 cm to divide into the ramus cranialis and the ramus caudalis.

Ramus Cranialis

The ramus cranialis proceeds craniolaterally and soon divides into smaller branches which ramify the m. rectus capitis lateralis, m. rectus capitis ventralis major, m. semispinalis capitis and m. longus colli. It anastomoses with the branches of the arteria occipitalis.

Ramus Caudalis

The ramus caudalis descends caudally along the m. sternothyrohyoideus and anastomoses with the branches of the arteria comes nervi vagi. It supplies branches to the m. ypsilotrachealis and m. sternothyrohyoideus.
**Fig. 51.**—Schematic illustration of the branches of the arteria carotis externa and the arteria carotis interna. Ap, A. palatina; Ae, A. ethmoidea; Aai, A. alveolaris inferior; At, A. temporalis; Aoe, A. ophthalmica externa; Apt, A. pterygoidea; Aa, A. auricularis; Aci, A. carotis interna; Ao, A. occipitalis; Rc, R. cutaneus; Rs, R. superficialis; Avc, A. vertebralis cranialis; Aam, A. alveolaris mandibulae; Am, A. mandibularis; As, A. sublingualis; Al, A. lingualis; Al, A. laryngea; Aed, A. esophagea descendens; Rp, R. profunda; Rm, R. muscularis; Ama, A. maxillaris.

**Fig. 52.**—The branches of the arteria carotis communis at the cranial end of the neck. Aci, A. carotis interna; Avc, A. vertebralis cranialis; Ace, A. carotis externa; Acc, A. carotis communis; Asc, A. subcutanea colli.
Arteria Carotis Externa

A. carotis externa
  A. esophagea descendens
  R. esophageus
  R. trachealis
  A. mandibularis
  A. laryngea
  A. alveolaris mandibulae
  A. sublingualis
  A. lingualis
  A. palatina
  A. maxillaris
  A. auricularis
  A. pterygoidea
  A. facialis

The arteria carotis externa (Figs. 50, Ace; 52, Ace) originates from the arteria carotis communis at the level of the atlas and 1 cm cranial to the origin of the arteria subcutanea colli. It proceeds cranially between the mandibles along the medial aspect of m. hyomandibularis and lateral aspect of the larynx, and gives rise to the arteria esophagea descendens 1 cm cranial to the bifurcation of the arteria carotis communis. The main trunk continues on the medial aspect of the mandible and divides into the arteria mandibularis, arteria sublingualis, arteria palatinus, and arteria maxillaris 0.5 cm cranial to the origin of the arteria esophagea descendens.
Arteria Esophagea Descendens

The artery (Figs. 50, Aed; 51, Aed) arises from the ventromedial wall of the arteria carotis externa. It proceeds caudally and gives off branches to the m. occipitomandibularis, m. hyomandibularis and esophagus. One centimeter caudad to its origin it bifurcates into the ramus esophagus and the ramus trachealis.

Ramus Esophageus

This vessel descends caudally on the ventral surface of the esophagus. It supplies branches to the esophagus and anastomoses with the esophageal branches of the arteria esophagea ascendens.

Ramus Trachealis

This arterial branch proceeds ventrocaudally and reaches the lateral border of the trachea. It supplies branches to the trachea and anastomoses with the tracheal branches of the arteria esophagea ascendens and the arteria laryngea.

Arteria Mandibularis

The arteria mandibularis (Fig. 51, Am) originates from the arteria carotis externa 0.5 cm craniod to the origin of the arteria esophagea descendens. It proceeds cranially between the m. hyomandibularis and pharynx, and courses under the m. mandibulomaxillaris and m. pterygo-quadratomaxillaris. It gives off the arteria laryngea 2 cm craniod to the origin of the arteria esophagea descendens and 1.5 cm craniod to its origin. The main trunk continues cranially and gives rise to the arteria alveolaris mandibulae 0.5 cm craniod to the origin of the arteria
laryngea. It supplies branches to the m. occipitomandibularis, m.
hyoideus transversus, m. hyomandibularis, m. mandibulomaxillaris, m.
mandibulopalatinus, m. pterygoquadroramaxillaris, m. pterygopalatinus
and m. quadratopalatinus.

Arteria Laryngea

This artery (Fig. 51, Al) originates from the arteria mandibularis
1.5 cm rostrad to the origin of the arteria esophagea ascendens. It
proceeds medially from its origin and comes to lie on the ventrolateral
aspect of the larynx and the cranial portion of the trachea. It anasto-
omoses with the tracheal branches of the arteria esophagea descendens and
the arteria esophagea ascendens.

Arteria Alveolaris Mandibulæ

The arteria alveolaris mandibulæ (Fig. 51, Aam) originates from
the arteria mandibularis 0.5 cm laterad to the origin of the arteria
laryngea and immediately enters the m. mylohyoideus. It anastomoses
with branches of arteria sublingualis and forms the arteria mentalis.
Anastomoses are found between it and the arteria alveolaris inferior on
the caudal one-third of the mandible. It supplies branches to the
intermaxilllary musculature, salivary glands and oral mucosa.

Arteria Sublingualis

This artery (Fig. 51, As) originates from the arteria carotis
externa at the level of origin of the arteria mandibularis. It proceeds
craniolaterally and passes over the lateral surface of the trachea. In
the intermaxillary space it courses laterad to the body of the hyoid
bone and medial to the salivary gland, where it enters the beak and
courses to its tip. The vessel supplies branches to the larynx, salivary glands, m. mylohyoideus, m. hyomandibularis, m. quadratopalatinus and m. pterygopharyngeus. At the level of the body of the hyoid bone it gives rise to the arteria lingualis, and anastomoses with the branches of the arteria alveolaris mandibulae.

Arteria Lingualis

The arteria lingualis (Fig. 51, Ali) arises from the arteria sublingualis and describes a posteromedial arc. It enters the base of the tongue and supplies branches to the m. styloentoglossum, m. copuloentoglossum and m. thyroentoglossum.

Arteria Palatina

This artery (Fig. 51, Ap) arises from the arteria carotis externa and proceeds toward the anterior nares on the medial aspect of the m. masseter. It courses with the arteria palatina of opposite side and enters the beak at the level of the rostral end of the nasal fissure. The artery may be traced to the tip of the beak and supplies branches to the angle of mouth and vicinity. Near the nasal opening it gives off small branches to the nasal mucosa and anastomoses with the arteria ethmoidea. It also gives off paired vessels near the nasal opening which describe an "S" shaped curve and supply small vessels to the oral and nasal mucosa.

Arteria Maxillaris

The arteria maxillaris (Fig. 51, Ama) takes its origin from the arteria carotis externa at the level of origin of the arteria mandibularis. It proceeds rostrally and reaches the vicinity of the
quadrate bone. Just caudad to the quadrate bone it gives rise to the arteria auricularis and the arteria pterygoidea. The main stem of the arteria maxillaris continues along the ventral border of the orbit as the arteria facialis.

Arteria Auricularis

This artery (Fig. 51, Aa) arises from the arteria maxillaris at the level of the caudal border of the quadrate bone. It ascends dorsally between the quadrate bone and the osseous auditory canal supplying branches to the m. depressor mandibulae and the external ear.

Arteria Pterygoidea

The arteria pterygoidea (Fig. 51, Apt) originates from the arteria maxillaris and supplies branches to the m. pterygopalatinus and m. pterygoquadratomaxillaris. It anastomoses with the branches of the arteria sphenoeidea.

Arteria Facialis

The artery (Fig. 51, Af) is the continuation of the arteria maxillaris after the origin of the arteria pterygoidea and it proceeds rostrally on the medial aspect of the quadrate bone. It penetrates the m. masseter, crosses the temporozygomatic ligament under the skin and ascends toward the medial canthus of the eye. It reaches the ridge of the lacrimal bone to divide in a fan-shaped fashion, and sends branches which anastomose with the arteria sphenoeidea. It supplies branches to the m. masseter, third eye lid, medial canthus of the eye, skin in the vicinity of the eye and nasal region.
Arteria Carotis Interna

A. Carotis interna

A. occipitalis
  R. cutaneus
  R. muscularis
  R. superficialis
  R. profunda

A. ophthalmica externa
  Plexus temporalis

A. temporalis

A. alveolaris inferior

A. sphenoeidea
  A. sphenomaxillaris

A. Carotis cerebralis

A. ophthalmica interna

R. oralis
  A. cerebri profunda
  A. fossae sylvii

A. cerebri nasalis

A. ethmoidea

R. aboralis

Aa. cerebelli nasalis

A. basilaris cerebri
  A. cerebelli aboralis
The arteria carotis interna (Figs. 51, Ac; 52, Ac) originates from the arteria carotis communis at the level of the atlas. It gives rise to the arteria occipitalis 0.5 cm cranial to its origin. The main trunk continues on the lateral aspect of the occipital bone and proceeds toward the foramen lacerum aboralis; passes through this foramen and enters the carotid canal. Here it gives rise to the arteria ophthalmica externa and follows a nasomedial direction in the carotid canal. The arteria sphenoeidea is given off the main stem in the carotid canal. The arteria intercarotica connects the arteria carotis interna of both sides in the diploe of the ethmoid bone. At the level of the sella turcica it enters the cranial cavity as the arteria carotis cerebralis.

Arteria Occipitalis

The arteria occipitalis (Fig. 51, Ao) arises from the arteria carotis interna 0.5 cm cranial to the origin of the arteria carotis communis. It proceeds toward the atlas and gives rise to the ramus cutaneus and the ramus muscularis. The main stem bifurcates into the ramus superficialis and the ramus profunda before entering the musculature in the region of the atlas.

Ramus Cutaneus

This vessel (Fig. 51, Rc) branches off the arteria occipitalis and courses under the skin. It anastomoses with a branch of the arteria comes nervi vagi.
Fig. 53. Schematic illustration of the arteries of the brain. Dorsolateral view. OB, Olfactory bulb; Ae, A. ethmoidea; OT, Optic tract; Aoi, A. ophthalmica interna; Acc, A. carotis cerebralis; Ra, R. aboralis; T, Tectum; M, Medulla oblongata; Acn, A. cerebri nasalis; C, Cerebrum; Ro, R. oralis; Acea, A. cerebelli aboralis; Ce, Cerebellum.

Fig. 54. Schematic illustration of the arteries of the brain. Ventral view. Afs, A. fossae sylvii; Acc, A. carotis cerebralis; Abc, A. basilaris cerebri; C, Cerebrum; OT, Optic tract; T, Tectum; Ce, Cerebellum; M, Medulla oblongata; Acn, A. cerebri nasalis; Ae, A. ethmoidea; Aoi, A. ophthalmica interna; Ro, R. oralis; Acp, A. cerebri profunda; Ra, R. aboralis; Acen, A. cerebelli nasalis; Acea, A. cerebelli aboralis.

Fig. 55. Schematic illustration of the arteries of the brain. Dorsal view. OB, Olfactory bulb; C, Cerebrum; Ce, Cerebellum; M, Medulla oblongata; Acn, A. cerebri nasalis; Afs, A. fossae sylvii; Acea, A. cerebelli aboralis.
Ramus Muscularis

This arterial branch (Fig. 51, Rm) takes origin from the artery occipitalis and soon divides into three branches; one branch courses caudally on the m. longus colli and supplies branches to it, and the other two branches proceed cranially along the vagus nerve toward the occipital bone.

Ramus Superficialis

The ramus superficialis (Fig. 51, Rs) courses toward the neck under the m. splenius and divides into two branches. One branch proceeds cranially and supplies the m. rectus capitis dorsalis and m. obliquus capitis cranialis; the other branch proceeds caudally and supplies the m. splenius.

Ramus Profunda

This vessel (Fig. 51, Rp) enters the musculature of the neck under the m. rectus capitis dorsalis and forms a convex arc. It anastomoses with the artery vertebralis cranialis at the level of the atlas.

Arteria Ophthalmica Externa

The arteria ophthalmica externa (Fig. 51, Aoe) arises from the artery carotis interna 1 cm cranial to the origin of the artery occipitalis and forms a dorsal convex arc inside the bone surrounding the osseous auditory canal. It emerges from the temporal bone under cover of the m. temporalis; divides into numerous small branches and forms a rete mirabile, the plexus temporalis. The arteria temporalis and the arteria alveolaris inferior arise from the temporal plexus in addition.
to many small vessels which ramify in the muscles of mastication. The main stem of the arteria ophthalmica externa is the largest vessel (Fig. 51, Aoe) arising from the temporal plexus and proceeds rostrally. It crosses the caudal border of the orbit and divides into many branches inside the orbit. A small branch supplies the upper and lower eye lids adjoining the lateral canthus; a larger vessel proceeds dorsally and follows the arch of the bony orbit along the medial wall of the orbital fossa, anastomosing with the arteria ethmoidea caudomedially. The main vessel continues rostrally and forms a caudodorsal convexity around the center of the orbit. Here it anastomoses with the arteria ophthalmica interna and forms an almost complete arterial loop around the optic nerve. From this anastomosis many branches arise which supply nutrition to the eye and its adnexa. A small vessel, the arteria centralis retinæ, proceeds toward the eyeball and supplies branches to the retina. Three to four branches course in a radial manner on the medial wall of the orbit and reach the medial canthus of the eye. The vessels supply branches to the medial wall of the eye, lacrimal gland and eye lids in the vicinity of the medial canthus.

Arteria Temporalis

This is a small vessel (Fig. 51, At) that courses toward the dorsal aspect of the m. temporalis. It supplies the m. temporalis and the skin overlying it.
Arteria Alveolaris Inferior

This artery (Fig. 51, Aai) is larger in caliber than the arteria temporalis. It passes through the m. masseter accompanied by the mandibular nerve and anastomoses with the arteria alveolaris mandibulae.

Arteria Sphenoidea

This artery arises from the arteria carotis interna just before the latter reaches the brain stem. It anastomoses with branches of the arteria pterygoidea thereby forming an arterial plexus. The main trunk continues rostrally and gives rise to the arteria sphenomaxillaris. The vessel then passes dorsally to the pterygoid bone and supplies branches to the skin in the vicinity of the orbit.

Arteria Sphenomaxillaris

This artery originates from the arteria sphenoidea and courses on the ventral surface of the pterygoid bone. It supplies branches to the upper pharyngeal and palatine region.

Arteria Carotis Cerebralis

The arteria carotis cerebralis (Figs. 53, Acc; 54, Acc) is a continuation of the arteria carotis interna in the cranial cavity. At the level of the center of the lateral border of the pituitary fossa it gives rise to the arteria ophthalmica interna. Soon the main vessel divides into the ramus oralis and the ramus aboralis.

Arteria Ophthalmica Interna

The artery (Figs. 53, Aoi; 54, Aoi) arises from the arteria carotis cerebralis and proceeds along with the optic nerve in the cranial
cavity. It anastomoses with the branches of the arteria ophthalmica externa in the orbit and gives off small branches which may be traced in the fold of the duramater to the olfactory bulb. There is no complete circulus arteriosus cerebri formed around the pituitary gland.

Ramus Oralis

This arterial branch (Figs. 53, Ro; 54, Ro) arises from the arteria carotis cerebralis at the level of the pituitary gland and just laterad to its origin it gives rise to the arteria cerebri profunda. It proceeds laterodorsally and comes to lie in the fossa Sylvian, where it gives rise to the arteria fossae Sylvii and bifurcates into the arteria cerebri nasalis and the arteria ethmoidea.

Arteria Cerebri Profunda

The arteria cerebri profunda (Fig. 54, Acp) arises from the ramus oralis and courses on the caudoventral surface of the brain. It courses between the cerebellum and the medulla oblongata, and supplies branches to both.

Arteria Fossae Sylvii

This artery (Figs. 54, Afs; 55, Afs) originates from the ramus oralis and enters the Sylvian fossa between the mesencephalon and cerebrum. It comes to lie on the dorsal surface of the cerebrum which it ramifies.

Arteria Cerebri Nasalis

The arteria cerebri nasalis (Figs. 53, Acn; 54, Acn; 55, Acn) arises from the ramus oralis and forms a lateral convex arc on the
ventral surface of the cerebrum. It gives off branches which penetrate the cerebrum and may be followed on the dorsal surface of the latter. One vessel proceeds laterally around the cerebrum and follows the olfactory nerve.

Arteria Ethmoidea

This arterial branch (Fig. 53, Ae; 54, Ae) arises from the ramus oralis and proceeds convergently under the brain stem. It enters the orbit and divides into two branches on the medial wall of the orbital fossa. One branch proceeds toward the lateral wall of the orbit and anastomoses with the arteria ophthalmica externa. The other branch is the continuation of the main vessel and crosses the arteria facialis. It passes over the lacrimal bone to enter the nasal cavity and here it anastomoses with the arteria palatina.

Ramus Aboralis

The arterial branch (Figs. 53, Ra; 54, Ra) arises from the arteria carotis cerebralis at the level of origin of the ramus oralis and continues caudally on the midline. It gives off 3 to 4 pairs of laterally coursing arteriae cerebelli nasalis at the level of the pons. The main trunk continues caudally on the ventral aspect of the medulla oblongata as the arteria basilaris cerebri.

Arteriae Cerebelli Nasalis

These vessels (Fig. 54, Acen) arise from the ramus aboralis and proceed laterally to supply the pons and the cerebellum.
Arteria Basilaris Cerebri

The arteria basilaris cerebri (Fig. 54, Abc) is the continuation of the ramus aboralis on the ventral aspect of the medulla oblongata. It gives off a paired vessel, the arteria cerebelli aboralis at the level of the middle of the medulla oblongata. The main trunk of the arteria basilaris cerebri becomes very small in caliber after the exit of the arteria cerebelli aboralis and branches into two parallel coursing vessels. These vessels anastomose with the arteria spinalis ventralis in the vicinity of the foramen magnum.

Arteria Cerebelli Aboonalis

This artery (Figs. 53, Acea; 54, Acea; 55, Acea) originates from the arteria basilaris cerebri and proceeds latero-caudally. It follows the vestibulocochlear nerve laterally on the inner surface of the temporal bone and here it gives off branches to the cochlea. The vessel divides into finer branches in a radial manner on the lateral surface of the cerebellum.

Arteria Subclavia

A. subclavia

A. sternoclavicularis

R. pectoralis

A. sternalis

A. clavicularis

R. pericardiophrenicus

A. axillaris

A. thoracica communis
This artery (Fig. 57, Asu) continues laterally and somewhat craniodorsally. It gives rise to the arteria sternoclavicularis 0.75 cm laterad to the origin of the common carotid artery and 0.25 cm mediad to the origin of the axillary artery. The subclavian artery gives rise to the ramus pericardiophrenicus immediately following the origin of the arteria sternoclavicularis. At a distance of 0.25 cm from the origin of sternoclavicular artery and 1 cm laterad to the origin of the common carotid artery, the arteria axillaris is given off the cranial wall of the subclavian artery. The main trunk continues laterally as the common thoracic artery.

Arteria Sternoclavicularis

This artery (Fig. 57, Asc) originates from the arteria subclavia 0.75 cm laterad to the origin of the common carotid artery and 0.25 cm mediad to the origin of the axillary artery. It proceeds cranially dorsad to the coracoid bone and divides into the ramus pectoralis, the arteria sternalis and the arteria clavicularis at the level of the caudal one-third of the coracoid bone.

Ramus Pectoralis

This arterial branch originates prior to the division of the main stem of the arteria sternoclavicularis into the sternal artery and the clavicular artery. It proceeds cranially under the m. sternocoracoideus and dorsal to m. supracoracoideus. It wraps around the lateral surface of the coracoid bone and passes along the cranial border of the m.
coracobrachialis ventralis. It supplies branches to the m. coracobrachialis ventralis and proceeds toward the shoulder joint supplying branches to the m. pectoralis superficialis, m. pectoralis profundus and capsule of the shoulder joint.

Arteria Sternalis

This artery winds around the coracoid bone under cover of the M. pectoralis profundus and supplies branches to the m. supracoracoideus, m. sternocoracoideus, and m. pectoralis profundus. A small twig, the ramus trachealis, is given off at the level of the medial border of the coracoid bone; reaches the trachea 2 cm cranial to the insertion of the m. sternotrachealis and supplies branches to the lower portion of the trachea.

Arteria Clavicularis

The arteria clavicularis crosses the m. sternocoracoideus dorsally and proceeds cranially and somewhat laterally parallel to the longitudinal axis of the coracoid bone. It supplies branches to the m. supracoracoideus, humeral end of the m. pectoralis superficialis and m. subscapularis, m. teres minor, and clavicular end of the m. biceps brachii.

Ramus Pericardiophrenicus

This arterial branch descends caudally and bifurcates at a distance of 0.50 cm from its origin. One branch courses towards the pulmonary diaphragm supplying branches to the mediastinal pleura,
pericardial pleura and pulmonary diaphragm; the second branch descends along the cranial vena cava and supplies branches to the pericardial and visceral pleura.

Arteria Thoracica Communis

A. thoracica communis

A. thoracica interna
  R. dorsalis
  R. ventralis

A. thoracica externa communis

A. thoracica externa lateralis
  A. thoracica externa lateralis cranialis
  A. thoracica externa lateralis caudalis

A. thoracica externa caudalis

A. thoracica externa caudalis dorsalis
  R. muscularis
  R. cutaneus

A. thoracica externa caudalis ventralis

The arteria thoracica communis (Fig. 57, Ate) is a continuation of the subclavian artery and measures 0.75 cm in length. It proceeds laterally and slightly ventrally, and emerges under the M. coracobrachialis ventralis cranial to the first costovertebral junction. It gives rise to the arteria thoracica interna before leaving the thoracic cavity. The main trunk of the common thoracic artery continues laterally outside the thoracic cavity as the arteria thoracica externa communis.
Fig. 56.—Schematic illustration of the arteria thoracica externa communis. T, Trachea; As, A. sternalis; Ac, A. clavicularis; Atel, A. thoracica externa lateralis; Atelcr, A. thoracica externa lateralis cranialis; Atec, A. thoracica externa communis; Atelca, A. thoracica externa lateralis caudalis; Atecd, A. thoracica externa caudalis dorsalis; Sk, Skin; PP, M. pectoralis profundus; PS, M. pectoralis superficialis; CBV, M. coracobrachialis ventralis; S, Sternum; OAE, M. obliquus abdominis externus; RA, M. rectus abdominis.
Arteria Thoracica Interna

This artery (Fig. 57, Ati) proceeds caudally within the thoracic cavity along the medial surface of the articulationes costovertebrales and divides into the ramus dorsalis and the ramus ventralis 1 cm caudad to its origin.

Ramus Dorsalis

This arterial branch proceeds caudally on the inner wall of the thoracic cavity and divides into two branches 2.50 cm caudad to its origin. One branch courses over the m. subcostalis supplying it with nutritive branches; the other branch proceeds somewhat caudally to reach the 3rd intercostal space where it begins supplying branches to the Mm. intercostales externi, and m. serratus dorsalis. The vessel may be followed caudally to the sixth intercostal space, and anastomosis between its branches and the branches of the intercostal arteries are observed in the intercostal spaces.

Ramus Ventralis

This arterial branch proceeds caudoventrally along the inner wall of the thoracic cavity near the articulationes sternocostales. It lies dorsal to the m. subcostalis for the most part. Some of its branches may be traced in the space between the lateral process of the sternum and the eighth rib. It supplies branches to the m. subcostalis, Mm. intercostales externi, Mm intercostales interni, m. obliquus externus abdominis, m. obliquus internus abdominis, and m. transversus abdominis. Some of the finer branches were observed to ramify in the m. pectoralis profundus in one male goose.
Arteria Thoracica Externa Communis

The arteria thoracica externa communis (Fig. 56, Atec) is a continuation of the common thoracic artery and measures 0.50 cm in length. Soon after its exit from the thoracic cavity it gives off a small muscular branch which proceeds medially and slightly ventrad to the m. coracobrachialis ventralis. The main trunk divides into the arteria thoracica externa lateralis and the arteria thoracica externa caudalis 0.50 cm laterad to its origin.

Arteria Thoracica Externa Lateralis

The artery (Fig. 56, Atel) proceeds cranially and divides into the arteria thoracica externa lateralis cranialis and the arteria thoracica externa lateralis caudalis in the m. pectoralis superficialis 2 cm from its origin.

Arteria Thoracica Externa Lateralis Cranialis

The artery (Fig. 56, Atelcr) ascends toward the shoulder joint and supplies branches to the m. pectoralis superficialis, m. trapezius, m. latissimus dorsi and m. teres major et infraspinatus. A few cutaneous branches are also given off, and supply the m. pectoralis superficialis and the cranial part of the sternal skin.

Arteria Thoracica Externa Lateralis Caudalis

The artery (Fig. 56, Atelca) proceeds ventrocaudally within the m. pectoralis superficialis and divides into finer branches within the muscle. Some of the branches pierce the muscle and come to lie under the skin of the keel region. It also supplies branches to the m. pectoralis profundus and m. coracobrachialis ventralis.
Arteria Thoracica Externa Caudalis

This artery is of the same diameter as that of the arteria thoracica externa lateralis. It courses laterocaudally dorsad to the m. pectoralis superficialis, and laterad to the m. scalenus and Mm. intercostales externi. Near its origin it gives off a small branch which supplies the m. pectoralis superficialis, and divides into the arteria thoracica externa caudalis dorsalis and the arteria thoracica externa caudalis ventralis at the level of the first rib.

Arteria Thoracica Externa Caudalis Dorsalis

This artery (Fig. 56, Atec) is smaller than the arteria thoracica externa caudalis ventralis and proceeds caudally along the dorsal border of the m. pectoralis superficialis and laterad to the m. obliquus externus abdominis. It gives off a muscular branch for the m. metapatagialis 2.50 cm caudad to its origin. During its course it gives off numerous muscular branches to the m. serratus ventralis cranialis, m. serratus dorsalis, m. serratus ventralis caudalis and m. obliquus externus abdominis. The main trunk continues caudally giving cutaneous branches and muscular branches to the m. pectoralis superficialis, m. obliquus externus abdominis and the skin overlying the sternum. At the level of the caudal end of sternum it divides into the ramus muscularis and the ramus cutaneus.

Ramus Muscularis

This branch is the smaller of the two and supplies branches to the m. obliquus externus abdominis.
Ramus Cutaneus

This arterial branch continues caudally from its origin and proceeds laterally on the abdomen. It supplies branches to the skin of the abdominal region.

Arteria Thoracica Externa Caudalis Ventralis

This artery (Fig. 56, Atecv) is larger in diameter than the arteria thoracica externa caudalis dorsalis. It penetrates the m. pectoralis superficialis and supplies it. Some of these branches penetrate through the m. pectoralis superficialis and come to lie under the skin as cutaneous branches. These cutaneous branches ramify in the skin of the caudal one-half of sternal region.

Arteria Axillaris

A. axillaris

A. acromialis

A. coracoscapularis

A. scapularis

A. coracoidea

A. profunda brachii

A. collateralis radialis

A. collateralis ulnaris

A. brachialis

A. circumflexa humeralis

A. nutriciae humeralis

A. radialis

R. muscularis
Fig. 57.—Schematic illustration of the arteries of the wing.
Asu, A. subclavia; Atc, A. thoracica communis; Ati, A. thoracica interna; Apb, A. profunda brachii; Acr, A. collateralis radialis; Acu, A. collateralis ulnaris; Aru, A. recurrens ulnaris; Arr, A. recurrens radialis; Au, A. ulnaris; Amv, A. metacarpea tertia; Amd, A. metacarpea quarta; Ai, A. indicis; Ar, A. radialis; Anh, A. nutriciae humeralis; Acha, A. circumflexa humeralis anterior; Ab, A. brachialis; Rm, R. muscularis; Ac, A. coracoidea; As, A. sternalis; Aa, A. acromialis; A, A. axillaris; Asc, A. sternoclavicularis.
Figs. 58, Dorsal view of the pectoral limb; 59, Ventral view of the pectoral limb.—Schematic illustration of the muscles and arteries of the wing. LD, M. latissimus dorsi; D, M. deltoideus; T, M. triceps brachii; H, Humerus; B, M. biceps brachii; ECR, M. extensor carpi radialis; E2, 3, M. extensor of the second and third digit. UL, M. ulnaris lateralis; E2, M. median digital extensor of the second digit; PL, M. patagialis longus; PB, M. patagialis brevis; PS, M. pectoralis superficialis. Aa, A. axillaris; Ab, A. brachialis; Apb, A. profunda brachii; Acr, A. collateralis radialis; Acu, A. collateralis ulnaris; Ar, A. radialis; Au, A. ulnaris; P, M. peroneus longus et brevis; ME2,3, M. median digital extensor of the second and third digit. ECO, M. extensor carpi obliquus; FCR, M. flexor carpi radialis.
A. recurrens radialis
A. indicis
A. metacarpea quarta
A. ulnaris
R. muscularis
A. recurrens ulnaris
A. metacarpea teritia
Rete cubitus caudalis

Arteria Axillaris

This artery (Figs. 57, A; 59, Aa) originates from the cranial wall of the subclavian artery 1 cm laterad to the origin of the common carotid artery. It proceeds craniolaterally and then caudally forming an arc. It gives rise to the arteria acromialis and the arteria coraco-scapularis from its cranial wall at a distance of 1.75 cm from its origin.

Arteria Acromialis

This artery (Fig. 57, Aa) originates from the axillary artery just prior to the origin of the arteria coracoscapularis, and proceeds crani-ally toward the shoulder joint and the long head of the m. triceps brachii.

Arteria Coracoscapularis

This artery arises from the axillary artery following the origin of the arteria acromialis and proceeds cranially toward the shoulder joint. It divides into the arteria subscapularis and the arteria coracoidea 1 cm cranial to its origin.
Arteria Subscapularis

The arteria subscapularis (Fig. 57, As) is larger in diameter than the coracoid artery. It proceeds craniolaterally from its origin and supplies branches to the m. teres major et infraspinatus, m. suprascapularis, m. deltoideus, medial head of m. triceps brachii, m. biceps brachii and m. serratus ventralis cranialis.

Arteria Coracoidea

This artery (Fig. 57, Ac) proceeds cranially from its origin dorsad to the m. supracoracoideus and courses toward the shoulder joint. It gives off branches to the m. supracoracoideus, m. teres minor, and coracoid bone.

The main trunk of the arteria axillaris continues laterodistally in the axilla and gives off branches to the m. supraspinatus, m. biceps brachii, m. patagialis longus and m. latissimus dorsi. At the level of the proximal one-fourth of the humerus it gives off a deep branch, the arteria profunda brachii. The main trunk of the axillary artery continues distally as the arteria brachialis.

Arteria Profunda Brachii

This artery (Fig. 57, Apb; 59, Apb) arises from the main trunk of the arteria axillaris at the level of the proximal one-fourth of the humerus. Near its origin it courses between the m. biceps brachii and medial head of the m. triceps brachii; then it proceeds medially winding around the ventral surface of the medial head of the m. triceps brachii. It then descends distally in the groove formed by the medial and long heads of the m. triceps brachii, gives off a strong branch 0.25 cm
mediad to its origin which supplies branches to the m. serratus ventralis cranialis, m. deltoideus, m. latissimus dorsi and m. patagialis longus. During its course between the medial and long heads of the m. triceps brachii it continues to supply branches to them. Slightly caudad to the center of the humerus the artery bifurcates into the arteria collateralis radialis and the arteria collateralis ulnaris.

Arteria Collateralis Radialis

This artery (Fig. 57, Acr; 59, Acr) winds around the medial surface of the humerus coursing under the long and lateral heads of the m. triceps brachii, and comes to lie on the cranial surface of the humerus. It then proceeds toward the elbow joint and anastomoses with the other branches of the ulnar artery. It supplies branches to the lateral head of the m. triceps brachii, m. patagialis longus and m. patagialis brevis.

Arteria Collateralis Ulnaris

This artery (Fig. 57, Acu; 59, Acu) is the continuation of the deep brachial artery and proceeds distally under cover of the long head of the m. triceps brachii. At the level of the distal one-fourth of the humerus it lies between the medial and long heads of the m. triceps brachii. The vessel may be traced to the caudal aspect of the carpus. It anastomoses with the branches of the recurrent ulnar artery in the carpal region and supplies branches to the medial and long heads of the m. triceps brachii, m. anconeus and m. expansorium secundum.
Arteria Brachialis

This artery (Fig. 57, Ab; 59, Ab) is a continuation of the arteria axillaris and proceeds distally, first between the m. biceps brachii and medial head of the m. triceps brachii, and then on the lateral surface of the m. biceps brachii; finally it descends under cover of the m. biceps brachii. It supplies branches to the m. biceps brachii and medial head of the m. triceps brachii. At the level of the proximal one-third of the humerus it gives rise to the arteria circumflexa humeralis. It gives rise to another branch, the arteria nutritiae humeralis near the center of the shaft of the humerus, and divides into the arteria radialis and the arteria ulnaris at the level of the distal metaphysis of the humerus 1.5 cm proximad to the articulatio humeroradialis.

Arteria Circumflexa Humeralis

The artery (Fig. 57, Acha) takes its origin from the brachial artery and proceeds proximally under cover of the m. biceps brachii. It supplies branches to the m. biceps brachii, m. patagialis longus, m. ptagialis brevis and m. patagialis accessorius. Some of the branches emerge to supply the skin.

Arteria Nutritiae Humeralis

This artery (Fig. 57, Anh) arises from the brachial artery close to the origin of the arteria circumflexa humeralis and proceeds toward the nutrient foramen. It supplies branches to the long head of the m. triceps brachii and finally the main stem enters the nutrient foramen of the humerus.
Arteria Radialis

The artery (Fig. 57, Ar; 59, Ar) separates from the arteria brachialis 1.50 cm proximad to the articulatio humeroradialis and proceeds laterodistally between the m. extensor carpi radialis and the m. pronator longus et brevis. The pronator longus et brevis separates the radial artery from the ulnar artery in their initial course between the heads of the m. supinator and m. pronator longus, it gives off a vessel, the ramus muscularis. The main stem courses distally beneath the m. median extensor of the second and third digit, m. extensor carpi obliquus, m. extensor carpi ulnaris, and m. extensor et adductor of second and third digit. At the level of the proximal one-fourth of the radius, the arteria recurrens radialis arises from the radial artery. In the distal one-third of the lower arm the radial artery gives off a vessel to the skin containing the flight feathers. This branch courses dorsolaterally between the m. extensor carpi ulnaris and m. extensor carpi obliquus and proceeds to supply the skin containing flight feathers. At the level of the second articulatio carpometacarpea it gives off a small vessel, the arteria indicis. The main trunk of the radial artery continues as the arteria metacarpea quarta.

Ramus Muscularis

This arterial branch originates from the radial artery and courses distally between the m. extensor carpi radialis and m. pronator longus et brevis. It supplies branches to both of these muscles and radiates with more branches into the patagium. The cutaneous branches supply
the m. patagialis longus, m. patagialis brevis and the skin containing flight feathers. These anastomose with each other and with branches of the arteria circumflexa humeralis.

Arteria Recurrens Radialis

The artery (Fig. 57, Arr) originates from the arteria radialis at the level of the proximal one-fourth of the radius and courses toward the articulatio humeroradialis. It contributes to the formation of the rete cubitus caudalis.

Arteria Indicis

This artery (Fig. 57, Ai) is given off the radial artery at the level of the second articulatio carpometacarpea. It supplies branches to the extensor and adductor of the second digit.

Arteria Metacarpea Quarta

The artery (Fig. 57, Amd) is a continuation of the radial artery. It proceeds distally toward the phalanges on the dorsal aspect of the third metacarpal bone and may be traced to the distal extremity of the first phalanx of the third digit. In its course on the metacarpal bone and phalanges it gives off branches to the extensor tendons of the third and fourth digit, and skin of this region. There are anastomosis present between it and the branches of the arteria metacarpea teritia.

Arteria Ulnaris

The arteria ulnaris (Fig. 57, Au; 59, Au) originates from the brachial artery 1.5 cm proximad to the articulatio humeroradialis. It crosses the m. pronator longus et brevis medially and proceeds distally
over the median extensor of the second and third digit. Near its origin it gives off a muscular branch, the ramus muscularis. At the level of the articulatio humeroulnaris it gives off a branch, the arteria recur- rens ulnaris. The main trunk continues distally over the median extensor and crosses to the medial surface of the m. extensor carpi obliquus at the level of the proximal one-third of the ulna. During its course it supplies muscular branches to the m. pronator longus et brevis, m. flexor carpi radialis, m. flexor carpi ulnaris, m. supinator lateralis, m. extensor carpi ulnaris, m. ulnaris lateralis and cutaneous branches to the skin. It continues as the arteria metacarpea tertia.

Ramus Muscularis

This arterial branch arises from the ulnar artery close to the bifurcation of the brachial artery and proceeds medially toward the articulatio humeroradialis. It supplies branches to the m. supinator medialis and m. brachialis and anastomoses with the branches of the arteria collateralis radialis. It contributes to the formation of the rete cubitus caudalis.

Arteria Recurrens Ulnaris

This artery (Fig. 57, Aru) originates from the ulnar artery at the level of the articulatio humeroradialis and proceeds caudally toward the medial aspect of the elbow joint. It supplies branches to the m. flexor carpi ulnaris, m. ulnaris lateralis, median extensor of the second and third digit. It also contributes to the formation of the rete cubitus caudalis.
Arteria Metacarpea Tertia

This artery (Fig. 57, Amv) is a continuation of the arteria ulnaris and proceeds distally toward the digits between the interosseous space formed by the third and fourth metacarpal bones. It supplies branches to the m. flexor brevis of the third digit, m. flexor brevis of the fourth digit, m. interosseous ventralis, flexor and adductor of the fourth digit, and m. interosseous dorsalis. Anastomosis between its branches and the branches of the arteria metacarpea quarta are present.

Rete Cubitus Caudalis

This network of arteries is present on the caudal aspect of the articulatio humeroradialis. The following arteries contribute to its formation:

1. Arteria collateralis ulnaris
2. Arteria collateralis radialis
3. Arteria recurrens ulnaris
4. Arteria recurrens radialis
5. Ramus muscularis

It supplies branches to the joint capsule and other structures in the area.

Aorta Descendens

Aorta descendens

Aa. intercostales caudalis (paired)
A. celiaca (unpaired)
A. mesenterica cranialis (unpaired)
A. suprarenalis (paired)
A. testicularis cranialis (paired)
Truncus gonadorenalis (paired)
A. iliaca externa (paired)
A. ischiadica (paired)
Aa. lumbosacralis (paired)
A. mesenterica caudalis (unpaired)
A. pudenda communis (paired)
A. sacralis mediana (unpaired)

The artery (Fig. 60, A; 61, A; 67, A) courses in the mediastinum and proceeds caudally to the right side of the thoracic vertebrae in its cranial part, it then comes to lie ventral to the vertebral column. The syrinx is related dorsally to the aorta ascendens and arcus aortae. As the thoracic aorta descends caudally into the thoracic cavity it crosses the right bronchus and comes to lie dorsal to it. Further caudally it courses parallel and 1 cm to the right of the esophagus in the mediastinum. The abdominal cavity is incompletely separated from the thoracic cavity by a rudimentary diaphragm; therefore the descending aorta is not described as thoracic and abdominal aorta. The descending aorta continues caudally on the ventral aspect of the vertebral column between the kidneys. At the level of the 12th segment of the lumbosacral mass it divides into the arteria pudenda communis sinistra, the arteria pundenda communis dextra and the arteria sacralis mediana.

The descending aorta gives off the following paired and unpaired branches in the thoracoabdominal cavity.
Fig. 60.--Schematic illustration of the arteria celiaca. A, Aorta; Ace, A. celiaca; Agd, A. gastrica dextra; Ags, A. gastrica sinistra; H, Heart; ap, A. proventriculus; L, Lung; Pr, Proventriculus; Li, Liver; rp, R. proventriculus; rd, R. dorsalis; rv, R. ventralis; G, Gizzard, P, Pancreas; D, Duodenum; R, Rectum.

Fig. 61.--Schematic illustration of the arteria celiaca. A, Aorta; Agd, A. gastrica dextra; Al, A. lienalis; Aic, A. ilioccecalis sinistra; Agdo, A. gastrica dorsalis; Si, Small intestines; C, Cecum; R, Rectum; H, Heart; L, Lung; Ace, A. celiaca; Ags, A. gastrica sinistra; Ahd, A. hepatica dextra; rp, R. pancreaticus; G, Gizzard; Apd, A. pancreaticoduodenalis; Agv, A. gastrica ventralis.
Paired Branches
1. Arteriae intercostales caudalis
2. Arteria suprarenalis
3. Arteria testicularis cranialis
4. Truncus gonadorenalis
5. Arteria iliaca externa
6. Arteria ischiadica
7. Arteriae lumbosacralis

Unpaired Branches
1. Arteria celiaca
2. Arteria mesenterica cranialis
3. Arteria mesenterica caudalis
4. Arteria sacralis mediana

Arteriae Intercostales Caudalis

A. Intercostalis
   R. dorsalis
   R. ventralis

Five pairs of intercostal arteries are given off the descending aorta in the vicinity of the fifth, sixth, and seventh thoracic vertebra.

The first pair of caudal intercostal arteries arise from the dorsolateral wall of the aorta opposite the origin of the celiac artery and slightly in front of the junction of the fifth and sixth thoracic vertebra. It ascends cranially on the ventral surface of the fifth and
fourth thoracic vertebra and then turns onto the lateral surface of the third thoracic vertebra and into the third intercostal space. The second pair of caudal intercostal arteries originate from the dorsolateral wall of the aorta 0.3 cm caudad to the origin of the first pair. Its origin is opposite the junction of the fifth and sixth thoracic vertebra. It ascends cranially on the ventral aspect of the fifth thoracic vertebra and then turns onto the lateral aspect of the fourth thoracic vertebra and the fourth intercostal space. The third pair of caudal intercostal arteries arise from the dorsolateral wall of the aorta between the origins of the celiac and cranial mesenteric arteries. The sixth articulatio costovertebrales is directly opposite to the origin of the third pair. It ascends cranially on the ventral aspect of the sixth thoracic vertebra and turns onto the lateral surface of the fifth thoracic vertebra to enter in the fifth intercostal space. The fourth pair of caudal intercostal arteries originate from the dorsolateral wall of the aorta at the level of origin of the cranial mesenteric artery. Its origin is directly opposite the junction of the sixth and seventh thoracic vertebra. It proceeds laterally and enters the sixth intercostal space. The fifth pair arise from the descending aorta below the origin of the arteria mesenterica cranialis and proceeds toward the seventh intercostal space. Each intercostal artery gives rise to the ramus dorsalis and the ramus ventralis.
Ramus Dorsalis

The artery supplies branches to the dorsal musculature and the skin overlying the thoracic vertebrae. It also sends a branch into the vertebral canal through the intervertebral foramen which contributes in the formation of the ventral spinal artery.

Ramus Ventralis

This artery courses in the intercostal space close to the caudal border of each rib. It supplies branches to the Mm. intercostales interna, M. intercostales externa, m. subcostalis, m. levator costarum, m. iliocostalis, M. intertrasversarius, m. serratus dorsalis, m. semi-spinalis dorsalis, and the m. obliquus externus abdominis.

Anastomoses are found between the ventral rami of the intercostal arteries and also between the ventral rami and the intercostal branches of the internal thoracic artery.

Arteria Celiaca

A. celiaca

Aa. proventriculus

A. gastrica sinistra

R. proventriculus

R. hepaticus

A. hepatica sinistra

R. dorsalis

R. ventralis

A. gastrica dextra

Aa. lienalis
A. hepatica dextra

R. duodenalis

A. iliocecalis sinistra

R. iliocecalis cranialis

R. iliocecalis caudalis

R. pancreaticus

A. pancreatico-duodenalis

A. gastrica dorsalis

A. gastrica ventralis

The arteria celiaca (Figs. 60, Ace; 61, Ace; 62, Ace) is an unpaired vessel which arises from the ventral wall of the aorta ascendens at the level of the junction of the 5th and 6th thoracic vertebra. It courses caudoventrally and to the left giving rise to the arteriae proventriculus 0.5 cm from its origin. The main trunk bifurcates into the arteria gastrica sinistra and the arteria gastrica dextra 4.5 cm caudoventrad to its origin. This bifurcation occurs beneath the dorsal aspect of the right lobe of the liver at the level of the junction of the upper and middle one-third of the proventriculus.

Arteriae Proventriculus

Three branches (Fig. 60, Ap) are given off the celiac artery 0.5 cm caudoventrad to the origin of the latter. Two branches proceed to the left on the right surface of the proventriculus and ascend cranially supplying branches to the proximal one-third of the proventriculus and distal portion of the esophagus. One branch descends on the right
Fig. 62.—Schematic illustration of the arteria gastrica sinistra. A, Aorta; Ace, A. celiaca; Agd, A. gastrica dextra; Ahs, A. hepatica sinistra; Ags, A. gastrica sinistra; rp, R. proventriculus; P, Proventriculus; rv, R. ventralis; rd, R. dorsalis; G, Gizzard.

Fig. 63.—Schematic illustration of the arteria gastrica dextra. Agd, A. gastrica dextra; Al, A. lienalis; S, Spleen; D, Duodenum; Aics, A. ilioccealis sinistra; Agdo, A. gastrica dorsalis; Agv, A. gastrica ventralis; Apd, A. pancreaticoduodenalis; GB, Gall Bladder; rd, R. duodenalis; Ahd, A. hepatica dextra.

Fig. 64.—Schematic illustration of the terminal branches of the arteria gastrica dextra. Apd, A. pancreaticoduodenalis; Agdo, A. gastrica dorsalis; Agv, A. gastrica ventralis; G, Gizzard.

Fig. 65.—The distribution of the arteria ilioccealis sinistra, arteria ilioccealis dextra and the arteria mesenterica caudalis. Aicd, A. ilioccealis dextra; Aics, A. ilioccealis sinistra; Amc, A. mesenterica caudalis.
dorsal surface of the proventriculus and supplies branches to the latter. Anastomosis between the branches of the arteria proventriculus and the ramus proventriculus are found at the level of the middle one-third of the proventriculus.

Arteria Gastrica Sinistra

This vessel (Figs. 60, Ags; 61, Ags; 62, Ags) has the same diameter as that of the arteria gastrica dextra. It courses caudoventrally and to the left at an angle of 20 to 30 degrees from the arteria gastrica dextra. At the level of the junction of middle and distal one-third of the proventriculus it gives rise to the ramus proventriculus. The vessel gives rise to a small vessel, the ramus hepaticus at the level of origin of the ramus proventriculus. The main trunk continues caudally along the distal one-third of the proventriculus giving off one to three branches to the right wall of the proventriculus. Under cover of the left lobe of the liver it gives off the arteria hepatica sinistra at the level of the cranial border of the gizzard. Following the origin of the arteria hepatica sinistra the vessel turns slightly to the left and then courses caudally on the ventral surface of the gizzard. At the level of the isthmus it gives off three branches; one branch ascends craniodorsally and to the left on the distal end of the proventriculus where it divides into finer branches; the other two branches supply radicals to the isthmus. One-half centimeter from the caudal border of the left lobe of the liver it gives off the ramus dorsalis. The main trunk continues caudally as the ramus ventralis.
Ramus Proventriculus

This vessel (Figs. 60, rp; 62, rp) originates from the arteria gastrica sinistra. It ascends cranially and supplies branches to the ventral surface of the middle one-third of the proventriculus. It anastomoses with the descending branches of the arteria proventriculus.

Ramus Hepaticus

This arterial branch arises from the arteria gastrica sinistra and proceeds to the right under cover of the right lobe of liver where it ramifies the hepatic lobe.

Arteria Hepatica Sinistra

This vessel (Figs. 60, Ahs; 62, Ahs) is derived from the arteria gastrica sinistra and proceeds ventrally and somewhat to the right toward the hilus of the left hepatic lobe. It gives off two to four branches to the left lobe of the liver; one large branch proceeds ventrocaudally on the visceral surface of the left lobe of the liver and passes onto the right border of the gizzard ramifying in the ventral muscle mass; the remaining branches course to the visceral surface of the left lobe of the liver where they divide into finer branches.

Ramus Dorsalis

This arterial branch (Figs. 60, rd; 62, rd) originates from the arteria gastrica sinistra and proceeds dorsocaudally to the dorsal muscle mass of the gizzard and supplies branches to it. The main trunk of the ramus dorsalis forms an arc on the left face of the gizzard and courses to the dorsal border where it ramifies.
Ramus Ventralis

This vessel (Figs. 60, rv; 62, rv) is the caudal continuation of the arteria gastrica sinistra following the origin of the ramus dorsalis. It proceeds toward the caudal border of the gizzard and supplies the ventral muscle mass.

Arteria Gastrica Dextra

This artery (Figs. 60, Agd; 61, Agd; 62, Agd; 63, Agd) courses caudoventrally and to the right at an angle of 20 to 30 degrees from the arteria gastrica sinistra along the right ventral surface of the proventriculus and the dorsal surface of the gall bladder. At the level of the spleen it gives off a small branch, the arteria lienalis. The arteria hepatica dextra arises from the arteria gastrica dextra at the level of the gall bladder. The main trunk continues caudally on the right dorsal surface of the gizzard and at the level of the pyloris it gives off the arteria iliocaecalis sinistra and the ramus pancreaticus 2.5 cm caudad to the origin of the arteria hepatica dextra. It continues caudally on the right face of the gizzard and 1 cm caudad to the origin of the arteria iliocaecalis sinistra it trifurcates into the arteria pancreaticoduodenalis, the arteria gastrica dorsalis, and the arteria gastrica ventralis.

Arteria Lienalis

The artery (Figs. 61, Al; 63, Al) is derived from the arteria gastrica dextra at the level of the spleen and at a right angle to the longitudinal axis of the arteria gastrica dextra. The arteria lienalis proceeds caudodorsally toward the hilus of the spleen where it ramifies.
Arteria Hepatica Dextra

The artery (Figs. 61, Ahd; 63, Ahd) arises from the arteria gastrica dextra at the level of the center of the gall bladder and 0.7 cm caudad to the origin of the arteria lienalis. It proceeds cranially on the dorsal surface of gall bladder and courses toward the hilus of the liver. It is accompanied by the vena portae and ductus hepaticus. The terminal portion of the duodenum forms an "S" shaped curve dorsad to the gall bladder. Before entering the right lobe of the liver it gives off a small artery, the arteria cystica to the gall bladder and hepatic duct. The vessel also supplies a duodenal ramus 0.5 cm dorsad to the hilus of the right lobe of the liver.

Ramus Duodenalis

This arterial branch (Fig. 63, Rd) proceeds caudodorsally toward the terminal portion of duodenum and soon divides into three branches. Two branches course toward the "S" shaped portion of the duodenum and the third branch proceeds to the jejunal portion of small intestine. Here it anastomoses with the jejunoduodenal branch of the arteria mesenterica cranialis.

Arteria Iliocecalis Sinistra

This artery (Figs. 61, Aic; 63, Aics; 65, Aics) originates from the arteria gastrica dextra forming an angle of 90 degrees with the parent trunk and proceeds dorsally to enter the dorsal mesentry between the ilium and the cecum. At the level of the upper one-third of the left cecum it divides into the ramus iliocecalis cranialis, and the ramus iliocecalis caudalis.
Ramus Iliocelalis Cranialis

This arterial branch ascends on the left cecum toward the origin of the latter and furnishes branches to the cecum and the mesenteric fat present between the left cecum and ilium. It also sends branches to the terminal part of the ilium and anastomoses with the ilial branches of the arteria iliocelealis dextra.

Ramus Iliocelalis Caudalis

The vessel proceeds caudally over the ventral surface of the left cecum and supplies branches to the caudal portion of the cecum, ilium and mesenteric fat. Anastomosis between it and the branches of the arteria mesenterica caudalis are observed on the left cecum.

Ramus Pancreaticus

This artery (Fig. 61, rp) is derived from the arteria gastrica dextra at the level of origin of the arteria iliocelealis sinistra and courses toward the cranial end of the 'S' shaped loop of the duodenum. It supplies branches to the pancreatic duct and cranial end of the pancreas.

Arteria Pancreaticoduodenalis

The artery (Figs. 61, Apd; 63, Apd) originates from the arteria gastrica dextra 1 cm caudal to the origin of the arteria iliocelealis sinistra. It proceeds caudally from its origin and enters in the loop of the duodenum. It is found lying under cover of the pancreas and gives branches to the latter and duodenum. Some of the branches are
found supplying either the duodenum or the pancreas but usually the pancreas and duodenum are supplied by the common branches of the arteria pancreaticoduodenalis.

Arteria Gastrica Dorsalis

This vessel (Figs. 61, Agdo; 63, Agdo; 64, Agdo) proceeds caudo-dorsally along the caudal border of the pyloris and then turns slightly to the right reaching the right dorsal border of the gizzard. The vessel supplies branches to the pyloris and the right dorsal surface of the gizzard. It anastomoses with the branches of the arteria gastrica ventralis.

Arteria Gastrica Ventralis

This artery (Figs. 61, Agv; 63, Agv; 64, Agv) arises from the arteria gastrica dextra at the level of origin of the arteria pancreaticoduodenalis and courses ventrocaudally towards the ventral muscle mass of the gizzard. It supplies branches to the ventral muscle mass along the right ventral surface and the right border of the gizzard. An anastomosis was observed between it and the ramus ventralis along the right border of the gizzard. It also anastomoses with the branches of the arteria gastrica dorsalis.

Arteria Mesenterica Cranialis

A. mesenterica cranialis

A. ilioccealis dextra

R. iliocolicus

R. ilioccealis
A. jejunoduodenalis

Aa. jejunalis

Aa. ilei

The artery (Fig. 66, Amcr) arises from the ventral wall of the descending aorta 1.5 cm caudad to the origin of the arteria celiaca and opposite the junction of the sixth and seventh thoracic vertebra. It proceeds ventrocaudally and comes to lie in the mesentry. At the level of origin of the ceca and 4 cm caudad to its origin it gives rise to the arteria ilioccelalis dextra and the arteria jejunoduodenalis. The main trunk of the arteria mesenterica cranialis continues caudally in the mesentry and 0.5 cm caudad to the origin of the arteria ilioccelalis dextra it gives rise to the arteriae jejunale and arteriae ilei in the loops of the small intestine.

Arteria Ilioccelalis Dextra

The artery (Figs. 65, Aicd; 66, Aicd) originates from the arteria mesenterica cranialis at the level of origin of the ceca and proceeds caudally toward the right cecum. It gives off the ramus iliocolicus 0.5 cm craniad to the origin of the right cecum. The main trunk of the arteria ilioccelalis dextra crosses the right cecum ventrally to continue as the ramus ilioccelalis in the mesenteric fat present between the right cecum and ilium.

Ramus Iliocolicus

This arterial branch (Fig. 66, rico) arises from the arteria ilioccelalis dextra 0.5 cm craniad to the origin of the right cecum. It descends on the cranial portion of the colon, and supplies branches to
Fig. 66.—Schematic illustration of the arteria mesenterica cranialis and the arteria mesenterica caudalis. A, Aorta; Amcr, A. mesenterica cranialis; Ajd, A. jejunoduodenalis; Aj, A. jejunalis; Ai, A. ilei; Amc, A. mesenterica caudalis; Aics, A. iliocoealis sinistra; Rico, R. iliocolicus; ric, R. iliocoealis; Aicd; A. iliocoealis dextra.
the terminal portion of the ilium and cranial portion of the colon. An anastomosis between it and the colic branch of the arteria mesenterica caudalis was found on the cranial portion of the colon.

Ramus Iliocecalis

The vessel (Fig. 66, ric) is a continuation of the arteria iliocecalis dextra in the mesenteric fat present between the right cecum and ilium. During its course in the mesenteric fat it gives branches to the right cecum, mesenteric fat and the ilium. Anastomoses between it and the ilial branches of the arteria iliocecalis sinistra were found on the terminal portion of the ilium.

Arteria Jejunoduodenalis

The artery (Fig. 66, Ajd) arises from the arteria mesenterica cranialis at the level of origin of the arteria iliocecalis dextra. It proceeds caudoventrally in the mesentry of the jejunum and divides into two to four branches before reaching the wall of the jejunum. One branch ascends toward the duodenum and supplies branches to the cranial portion of the latter and the terminal portion of the duodenum. It anastomoses with the duodenal ramus of the arteria hepatica dextra on the 'S' shaped loop of the duodenum. The remaining three branches supply the jejunum.

Arteriae Jejunalis

These arteries (Fig. 66, Aj) are given off the arteria mesenterica cranialis 0.5 cm caudad to the origin of the arteria iliocecalis dextra. They proceed toward the wall of the jejunum and divide into two to four
branches before reaching the jejunal wall. They supply branches to the mesenteric fat and jejunum, and anastomose with the jejunal branches of the arteria jejunoduodenalis.

Arteriae Ilei

These vessels (Fig. 66, Ai) arise from the arteria mesenterica cranialis at the level of origin of the arteriae jejunalis. They proceed in the mesentry toward the loops of the ilium and divide into branches before reaching the ilial wall. They supply branches to the ilium and anastomose with the ilial branches of the arteria iliocecalis dextra. Homoejunal, interjejunal, homoiilial and interiliial anastomoses are found in the mesentry of the jejunum and ilium.

Arteria Suprarenalis Cranialis

This vessel (Fig. 67, Asc) is a paired vessel and arises from the descending aorta 0.2 cm caudad to the origin of the arteria mesenterica cranialis. It proceeds caudally and enters the adrenal gland.

Arteria Testicularis Cranialis

The arteria testicularis cranialis (Fig. 67, Atc) is a small paired vessel that originates from the ventral wall of the descending aorta 1.6 cm caudad to the origin of the arteria mesenterica cranialis. The testes are located on either side of the junction of the common iliac veins; these two veins fuse with each other at the cranial border of kidneys and ventrocaudal border of adrenal glands. The arteria testicularis cranialis proceeds ventrocaudally from its origin and enters the testes.
Truncus Gonadorenalis

Truncus gonadorenalis

A. suprarenalis caudalis
A. testicularis caudalis
A. renalis cranialis

This vessel (Fig. 67, Tr) is derived from the descending aorta 2.2 cm caudad to the origin of the arteria mesenterica cranialis and 1.5 cm cranial to the origin of the arteria iliaca externa. It is a paired vessel and proceeds laterally for 0.7 cm. On the ventral aspect of the cranial lobe of the kidney it divides into the arteria suprarenalis caudalis, the arteria testicularis caudalis and the arteria renalis cranialis.

Arteria Suprarenalis Caudalis

This vessel (Fig. 67, Asca) proceeds cranially from its origin and enters the adrenal gland.

Arteria Testicularis Caudalis

This artery (Fig. 67, Atca) courses laterally from its origin and proceeds on the ventromedial surface of the testes. It supplies branches to the testes and epididymus.

Arteria Renalis Cranialis

The artery (Fig. 67, Arc) proceeds ventrally from its origin and courses on the ventral surface of the cranial lobe of the kidney. Before entering the parenchyma of the kidney it gives off a branch, the arteria uretodeferentialis cranialis to supply the cranial one-third
Fig. 67.—Schematic illustration of the descending aorta. A, Aorta; Asc, A. suprarenalis cranialis; Atc, A. testicularis cranialis; Tr, Truncus gonadorenalis; Aie, A. iliaca externa; Ari, A. renalis intermedius; Ai, A. ischiadica; Arca, A. renalis caudalis; Ape, A. pudenda externa; Ap, A. pudenda interna; Asm, A. sacralis mediana; Apc, A. pudenda communis sinistra; Amc, A. mesenterica caudalis; Ap, A. pelvina; Af, A. femoris; Acf, A. circumflexa femoris; Rm, R. muscularis; Agc, A. glutea cranialis; Arc, A. renalis cranialis; Atca, A. testicularis caudalis; Asca, A. suprarenalis caudalis; Aic, A. intercostalis caudalis.
portion of the ductus deferens and the cranial portion of the ureter. The main trunk enters the cranial lobe of the kidney and divides into finer branches. It anastomoses with the branches of the arteria renalis intermedius.

Arteria Iliaca Externa

A. iliaca externa
A. pelvina
A. glutea cranialis
R. muscularis
A. circumflexa femoris
A. femoris

This paired vessel (Figs. 67, Aie; 69, Aie) originates from the abdominal aorta at a right angle to the longitudinal axis of the latter. It proceeds laterally and slightly caudally on the dorsal surface of the middle lobe of the kidney. At the lateral border of the kidney it gives off a branch, the arteria pelvina 1.5 cm from its origin. The main trunk of the external iliac artery continues laterally and crosses the vertebral end of the last rib dorsally. It emerges from the abdominal cavity and comes to lie on the medial aspect of the thigh. The arteria glutea cranialis arises 1 cm laterad to the origin of the arteria pelvina. Coursing between the m. sartorius and m. pectinius, the vessel gives off another small branch, the ramus muscularis, 0.5 cm laterad to the origin of the cranial gluteal artery. The main trunk continues
distally between the m. sartorius and m. rectus femoris, and bifurcates into the arteria circumflexa femoris and the arteria femoris 2 cm laterad to the origin of the cranial gluteal artery.

Arteria Pelvina

This artery (Fig. 67, Ap) proceeds caudoventrally on the lateral boundary of the pelvic cavity along the pelvic surface of the pubic bone. Near its origin it gives off a branch to the abdominal air sac. At the level of the cranial one-third of the pubic bone it gives rise to a branch which proceeds cranioventrally toward the last rib supplying the intercostal muscles. An anastomosis between the vessel and the last caudal intercostal artery was found caudad to the eighth vertebral rib. Its muscular branches anastomose with the branches of the external pudic artery on the obturator internus muscle.

Arteria Glutea Cranialis

This vessel (Fig. 67, Agc; 69, Agc) proceeds craniodorsally toward the dorsal surface of the ilium. It supplies branches to the m. gluteus superficialis, m. gluteus medius, and m. gluteus profundus. Some of the branches pierce these muscles and come to lie under the skin overlying the lumbosacral bony mass.

Arteria Circumflexa Femoris

This vessel (Fig. 67, Acf; 69, Acf) is one of the terminal branches of the arteria iliaca externa. It proceeds craniolaterally from its origin for one-half centimeter giving off a branch, the ramus glutea, which ascendscranially to bifurcate near the caudal border of the m. sartorius. The ramus glutea crosses the m. sartorius along its
Fig. 68.---Schematic illustration of the arteria ischiadica. Lateral view of the thigh. Ai, A. ischiadica; S, M. sartorius; Atp, A. tibialis posterior; PL, M. peroneus longus; GS, M. gluteus superficialis; GP, M. gluteus profundus; Agca, A. glutea caudalis; Apf, A. profunda femoris; Afc, A. femoris caudalis; ST, M. semitendinosus; BF, M. biceps femoris; QF, M. quadriceps femoris; TF, M. tensor fasciae latae.

Fig. 69.---The distribution of the arteria iliaca externa and the arteria ischiadica. Medial view of the thigh. A, Aorta; Ai, A. ischiadica; Aie, A. iliaca externa; Agc, A. glutea cranialis; Afc, A. circumflexa femoris; S, M. sartorius; P, M. pectineus; rm, R. muscularis; Af, A. femoris; A, M. adductor; G, M. gastrocnemius; ST, M. semitendinosus; Gr, M. gracilis; SM, M. semimembranosus.
ventral surface and proceeds toward the gluteal musculature. The main stem of the circumflex femoral artery continues on the caudal border of the m. sartorius toward the stifle joint supplying branches to the m. sartorius, m. tensor fasciae latae and m. rectus femoris.

Arteria Femoris

This vessel (Fig. 67, Af; 69, Af) courses toward the stifle joint. During its course it supplies branches to the m. rectus femoris and m. pectineus. At the level of the stifle joint it anastomoses with the branches of the medial tibial artery and gives off a branch for the medial aspect of the stifle joint.

Arteria Ischiadica

A. ischiadica

A. renalis intermedius
A. renalis caudalis
A. uretodeferentiales intermedius
A. obturatoria
A. glutea caudalis
A. trochanterica
A. profunda femoris
A. nutriciae femoris
A. poplitea

A. femoris caudalis
A. tibialis posterior
A. genus supreme
A. tibialis medialis
A. peronealis
A. tibialis lateralis
R. tibialis
R. fibularis
A. tibialis anterior
A. recurrens tibialis anterior
Rete tarsi
A. dorsalis pedis
A. metatarsalis plantaris communis
A. metatarsalis plantaris medius
R. proximalis medius
R. distalis medius
A. metatarsalis plantaris lateralis
R. proximalis lateralis
R. distalis lateralis
A. metatarsalis dorsalis medius
A. digití prima
A. digití lateralis secunda
A. digití medialis secunda
A. digití medialis tertia
A. metatarsalis dorsalis lateralis
A. digití lateralis tertia
A. digití medialis quarta
A. digití lateralis quarta

The artery (Figs. 67, Ai; 68, Ai; 69, Ai) is the main source of blood supply to the caudal limb. It is a paired vessel and corresponds
to the common iliac artery of the mammals. It originates from the abdominal aorta 2.2 cm caudal to the origin of the external iliac artery. It departs from the aorta at an angle of 70 degrees dorsad to the cranial portion of the caudal lobe of the kidney. It gives off the arteria renalis intermedia, the arteria renalis caudalis and the arteria uretodeferentiales intermedia 1 cm laterocaudal to its origin. The main trunk continues laterally in the abdominal cavity, passes through the ischiadic foramen and gives off the arteria obturatoria and the arteria glutea caudalis at the level of the ischiadic foramen.

After its exit from the ischiadic foramen, the ischiadic artery proceeds distally parallel to the longitudinal axis of the femur along with the ischiadic nerve. It is related cranially to the caudal border of the m. vastus lateralis, caudally to the cranial border of the m. biceps femoris, laterally to the m. biceps femoris and medially to the m. quadratus femoris and the m. adductor. During its course in the thigh it gives off the arteria trochanterica, the arteria profunda femoris, and the arteria nutriciae femoris.

The vessel continues distally over the caudal surface of the femur and gives off many unnamed branches to the surrounding muscles. It crosses the popliteal space as the arteria poplitea.

Arteria Renalis Intermedia

This vessel (Fig. 67, Ari) originates from the cranial wall of the ischiadic artery and proceeds cranially in the middle lobe of the kidney. Here it divides into finer branches and gives off a small branch to supply the ureter and ductus deferens. The main stem may be traced in
the middle lobe of the kidney to the level of the external iliac artery. Anastomosis between the vessel and the branches of the cranial renal artery may be found by removing small pieces of the kidney.

Arteria Renalis Caudalis

The artery (Fig. 67, Arca) originates from the caudal wall of the ischiadic artery opposite the origin of the arteria renalis intermedius. It proceeds caudally in the parenchyma of the caudal lobe of the kidney. It may be followed to the caudal border of the caudal lobe of the kidney. During its course in the kidney it supplies branches to the caudal lobe and a branch to the ureter and the ductus deferens.

Arteria Uretodeferentiales Intermedius

This vessel (Fig. 67, Aui) is derived from the ventral wall of the ischiadic artery close to the origin of the arteria renalis intermedius. It supplies branches to the ureter and ductus deferens.

Arteria Obturatoria

This artery (Figs. 70, Ao; 74, Ao) is derived from the cranial wall of the ischiadic artery before the latter passes through the ischiadic foramen. It supplies branches to the m. obturatorius internus, m. obturatorius externus, m. gemellus, m. iliacus and the origin of the m. adductor.

Arteria Glutea Caudalis

This artery (Figs. 68, Agca; 71, Agc; 74, Agc) originates from the ischiadic artery at the level of the ischiadic foramen. It crosses the foramen along with the ischiadic artery under cover of the m. biceps
Fig. 70.—Schematic illustration of the arteria ischiadica at the level of the foramen ischiadica. IF, Ischiadic foramen; OE, M. obturatorius externus; QF, M. quadratus femoris; A, M. adductor; Ao, A. obturatoria; I, M. iliacus; Ai, A. ischiadica.

Fig. 71.—The distribution of the arteria ischiadica. Age, A. glutea caudalis; OE, M. obturatorius externus; SM, M. semimembranosus; G, M. gracilis; GS, M. gluteus superficialis. I, M. iliacus; P, M. pectineus; QF, M. quadratus femoris; A, M. adductor; ST, M. semitendinosus; BF, M. biceps femoris; Anf, A. nutriciae femoris; Apf, A. profunda femoris.

Fig. 72.—The arteries of the pelvic limb. Af, A. femoris caudalis; S, M. sartorius; LG, Lateral head of the m. gastrocnemius; PL, M. peroneus longus; MG, Medial head of the m. gastrocnemius; Atp, A. tibialis posterior; Ap, A. poplitea; Apf, A. profunda femoris; Anf, A. nutriciae femoris; VL, M. vastus lateralis; P, M. pectineus.

Fig. 73.—The distribution of the arteria poplitea. S, M. sartorius; Atp, A. tibialis posterior; MG, Medial head of the m. gastrocnemius; PL, M. peroneus longus; LG, Lateral head of the m. gastrocnemius; Atm, A. tibialis medialis; G, M. gracilis; SM, M. semimembranosus; Ap, A. poplitea; Ape, A. peronealis; A, M. adductor.
femoris. Here it furnishes branches to the m. gluteus superficialis, the origin of the m. gracilis and the m. tensor fasciae latae. The main stem of this artery continues caudally under the m. biceps femoris reaching the ventral surface of the m. semitendinosus and the dorsal surface of the m. semimembranosus. During its course it supplies branches to these muscles and sends twigs to the m. quadratus femoris and m. gracilis.

Arteria Trochanterica

The artery arises from the ischiatric artery slightly distal to the origin of the caudal gluteal artery. It proceeds to the lateral surface of the hip joint supplying the joint capsule and the insertions of the Mm. gluteus, m. obturatorius externus, m. obturatorius internus and m. gemellus.

Arteria Profunda Femoris

The artery (Figs. 68, Apf; 71, Apf; 74, Apf) originates from the ischiatric artery at the level of the distal one-third of the femur. It proceeds caudally and courses on the lateral border of the m. quadratus femoris and the medial surface of the m. semitendinosus. It is related medially to the m. quadratus femoris, m. adductor, and m. semimembranosus; laterally to the m. biceps femoris and the m. semitendinosus. It supplies branches to the m. gracilis, m. quadratus femoris, m. vastus lateralis, m. adductor and the m. semimembranosus. Anastomoses between its branches and the branches of the caudal gluteal artery are found in the m. semimembranosus. Some of the branches proceed laterally between
the m. biceps femoris and m. semitendinosus, and come to lie under the skin at the level of the thigh and proximal portion of the tibia.

Arteria Nutriciae Femoris

This vessel (Figs. 71, Anf; 74, Anf) is derived from the ischiadic artery slightly caudad to the origin of the deep femoral artery. It proceeds toward the caudal surface of the femur and enters the shaft of the femur through the nutrient foramen. It also supplies branches to the m. biceps femoris, m. adductor and m. semimembranosus.

Arteria Poplitea

The artery (Fig. 72, Ap; 73, Ap; 74, Ap) descends distally between the caudal border of the m. vastus lateralis and the cranial border of the m. biceps femoris at the level of the distal one-fourth of the femur. It gives muscular branches to the m. biceps femoris and m. vastus lateralis. One-half centimeter caudad to the origin of the deep femoral artery it gives rise to the arteria femoris caudalis. The main trunk of the popliteal artery continues distally and gives off the arteria tibialis posterior. The vessel continues on the caudal surface of the m. gastrocnemius caput mediale and proceeds toward the popliteal space. Somewhat distad to the stifle joint and at the level of popliteal notch it gives off the arteria genus supreme and the arteria tibialis medialis. The main trunk continues distally in the popliteal space and gives off the arteria peronialis. At the level of the proximal interosseous space formed by tibia and fibula the vessel divides into the arteria tibialis lateralis and the arteria tibialis anterior.
Arteria Femoris Caudalis

This vessel (Figs. 68, Afc; 72, Afc; 74, Afc) originates from the lateral wall of the popliteal artery, proceeding laterally under cover of the m. biceps femoris it divides into two rami. One ramus courses latero-caudally and comes to lie on the caudal surface of the lateral head of the m. gastrocnemius. Here it divides into two branches which enter the lateral head of the m. gastrocnemius. The second ramus proceeds toward the m. biceps femoris, and gives off branches to the latter, the m. vastus lateralis and the m. tensor fasciae latae. Anastomoses between the branches of the caudal femoral artery and the branches of deep femoral artery are found in the m. biceps femoris.

Arteria Tibialis Posterior

The artery (Figs. 68, Atp; 72, Atp; 73, Atp; 74, Atp) courses toward the distal extremity of the tibia lying between the two heads of the m. gastrocnemius. It supplies branches to the m. semitendinosus, m. semimembranosus, m. gracilis, medial and lateral heads of m. gastrocnemius, m. flexor perforatus digiti secundi, m. flexor perforatus digiti tertii, and the m. flexor perforatus digiti quarti. Anastomoses between the branches of the arteria tibialis posterior and branches of the arteria femoris caudalis are present in the m. gastrocnemius caput laterale.

Arteria Genus Supreme

The artery (Fig. 74, Ags) proceeds medially from its origin and winds around the medial surface of the neck of the tibia. The vessel
furnishes branches to the m. gastrocnemius caput mediale, m. sartorius, m. semitendinosus, m. vastus medialis, m. proneus longus, and the m. flexor digitus perforatus et perforans digitii tertii.

Arteria Tibialis Medialis

This artery (Figs. 74, Atm; 75, Atm) proceeds from the main trunk at the level of origin of the arteria genus supreme. It proceeds distally from its origin on the lateral side of the m. tibialis caudalis. During its course toward the tarsal joint it supplies branches to the m. semitendinosus, m. rectus femoris, m. gastrocnemius caput mediale, m. gastrocnemius caput tibiale, m. peroneus longus, m. extensor digitus longus and the m. tibialis caudalis.

Arteria Peronealis

This artery (Fig. 75, Apr) proceeds laterally from its origin toward the stifle joint. It supplies branches to the gastrocnemius caput laterale, m. extensor digitus longus, m. tibialis cranialis, m. flexor digiti perforatus et perforans digitii tertii and the m. flexor digiti perforans.

Arteria Tibialis Lateralis

The artery (Fig. 75, Atl) courses laterally and crosses the proximal interosseous space formed by the tibia and fibula. It comes to lie between the m. extensor digitus longus and the m. flexor digiti perforatus et perforans digitii tertii. The vessel soon divides into the ramus tibialis and the ramus fibularis on the lateral aspect of tibia at the level of the proximal interosseous space.
Fig. 74.—Schematic illustration of the arteria ischiadica. Agc, A. glutea caudalis; Apf, A. profunda femoris; Afc, A. femoris caudalis; Atp, A. tibialis posterior; Atm, A. tibialis medialis; Adp, A. dorsalis pedis; Ao, A. obturatoria; Amf, A. nutriciae femoris; Ap, A. poplitea; Asg, A. genus supreme, Atl, A. tibialis lateralis; Ata, A. tibialis anterior; rt, R. tibialis; rf, R. fibularis; Arta, A. recurvens tibialis anterior; rta, Rete tarsi.

Fig. 75.—The distribution of the arteria dorsalis pedis. Ata, A. tibialis anterior; rt, R. tibialis; Ampm, A. metatarsea plantaris medialis; Adp, A. dorsalis pedis; Amdm, A. metatarsea dorsalis medialis. Aml, A. digití prima; Adm, A. digití medialis secunda; Adl, A. digití lateralis secunda; Admt, A. digití medialis tertia; Adlt, A. digití lateralis tertia; Admq, A. digití medialis quarta; Adlq, A. digití lateralis quarta.
Ramus Tibialis

The artery (Fig. 74, rt) lies medially to the ramus fibularis and proceeds craniodistally toward the tarsal joint. It supplies branches to the m. extensor digitus longus, m. tibialis cranialis, m. peroneus longus, m. peroneus brevis, and m. flexor digitus perforans. The vessel contributes to the formation of the rete tarsi.

Ramus Fibularis

This arterial branch (Fig. 75, rf) proceeds caudolaterally on the lateral surface of the m. flexor digitus perforatus et perforans digitii tertii toward the tarsal joint. During its course it gives off branches to the m. gastrocnemius caput tibialis, m. flexor digitus perforatus et perforans digitii tertii, m. flexor hallucis longus, and m. tibialis caudalis. It contributes to the formation of the rete tarsi on the cranial surface of the distal one-fourth of the tibia and tarsal joint.

Arteria Tibialis Anterior

This vessel (Fig. 74, Ata; 75, Ata) is a continuation of the arteria poplitea. It does not cross the proximal interosseous space but proceeds distally on the caudal surface of the tibia in a groove formed by the tibia and fibula. At the level of the distal interosseous space it crosses onto the lateral surface of the tibia through the distal interosseous space. At the level of the distal one-fourth of the tibia it winds from the lateral surface to the cranial surface of tibia. During its course on the caudal surface of the tibia it is related cranially to the latter, and caudally to the m. flexor hallucis longus. Here the vessel supplies branches to m. semitendinosus, m.
vastus medialis, m. flexor digitus perforatus et perforans digitii tertii, m. flexor digitus perforatus et perforans digitii quarti and m. tibialis caudalis. During its course on the lateral surface of the tibia it is related cranially to the tibialis cranialis and m. flexor digitus perforatus et perforans digitii secundi; medially to the m. extensor digiti longus, and laterally to the m. flexor digiti perforatus et perforans digiti tertii. It supplies branches to the m. tibialis cranialis, m. extensor digiti longus, m. peroneus longus, m. flexor digitus perforatus et perforans digitii secundi and m. flexor digiti perforatus et perforans digiti tertii. At the level of the center of the tibial shaft it gives off a recurrent branch, the arteria recurrens tibialis anterior. During its course on the cranial surface of tibia it is related to the tendons of the m. tibialis cranialis, m. extensor digiti longus, m. peroneus longus and m. peroneus tertius. Here the vessel contributes in the formation of rete tarsi along with the ramus tibialis and ramus fibularis. The main trunk continues distally as the arteria dorsalis pedis.

Arteria Recurrens Tibialis Anterior

The artery (Fig. 74, Arta) originates from the anterior tibial artery at the level of the center of the tibial shaft and proceeds proximally. It supplies branches to the m. gastrocnemius caput tibiale, m. tibialis cranialis, m. extensor digiti longus and m. peroneus longus.

Rete Tarsi

The rete (Fig. 74, rta) is an arterial network formed on the cranial surface of the distal one-fourth of the tibia and the dorsal
aspect of the tarsal joint. This network is contributed by the arteria tibialis anterior, arteria tibialis medialis, ramus tibialis, ramus fibularis, arteria metatarsae plantaris medialis, and the arteria metatarsae plantaris lateralis.

Arteria Dorsalis Pedis

As the arteria tibialis anterior descends distally from the cranial surface of the tarsal joint onto the dorsal aspect of the metatarsal bone it derives the name, the arteria dorsalis pedis (Figs. 74, Adp; 75, Adp). The latter is covered by the tendon of the m. extensor digitorum longus, and at the level of proximal one-fourth of the metatarsal bone it gives off the arteria metatarsae plantaris communis, which soon divides into the arteria metatarsae plantaris medialis and the arteria metatarsae plantaris lateralis. The main trunk of the dorsal pedal artery continues distally over the dorsal surface of the metatarsal bone. It bifurcates slightly above the metatarsophalangeal joint of the first digit into the arteria metatarsae dorsalis medialis and the arteria metatarsae dorsalis lateralis.

Arteria Metatarsae Plantaris Medialis

The artery (Fig. 75, Ampm) originates from the arteria metatarsae plantaris communis and proceeds medially to the medial border of the metatarsal bone. Here the vessel divides into the ramus proximalis medialis and the ramus distalis medialis.
Ramus Proximalis Medialis

The artery (Fig. 75, Rpm) ascends toward the tarsal joint and anastomoses with the rete tarsi. The vessel supplies branches to the mediocaudal aspect of tarsal joint and the overlying skin.

Ramus Distalis Medialis

The artery (Fig. 75, Rdm) descends distally along the medial edge of the plantar surface of the metatarsal bone and may be traced to the middle of tarsal bone. It supplies branches to the m. flexor hallucis brevis and m. interossei.

Arteria Metatarsae Plantaris Lateralis

This vessel (Fig. 75, Ampl) proceeds laterally toward the lateral border of the metatarsal bone. The vessel soon divides into the ramus proximalis lateralis and the ramus distalis lateralis.

Ramus Proximalis Lateralis

This arterial branch (Fig. 75, Rpl) ascends toward the proximal extremity of the tibia and anastomoses with the rete tarsi. It supplies branches to the tarsal joint.

Ramus Distalis Lateralis

This branch (Fig. 75, Rdl) courses toward the metatarsophalangeal joint of the fourth digit and anastomoses with the arteria metatarsae dorsalis lateralis. It supplies branches to the m. flexor digitorum brevis and the fascia surrounding the tendons of the superficial, intermediate and the deep flexor muscles.
Arteria Metatarsea Dorsalis Medialis

The artery (Fig. 75, Amdm) courses dorsomedially toward the distal extremity of the metatarsal bone. The vessel gives off the arteria digiti prima (Fig. 75, Aml). The main trunk continues distally on the lateral surface of the second digit as the arteria digiti lateralis secunda (Fig. 75, Adl). At the level of the metatarsophalangeal joint of the second digit, the arteria digiti medialis secunda (Fig. 75, Adm) is given off which descends along the medial aspect of the second digit. The arteria digiti medialis tertia is given off at the level of the third metatarsophalangeal joint which courses along the medial aspect of the third digit. It supplies branches to the m. adductor digitorum secundi, m. extensor hallucis brevis and the web of the foot between the second and the third digit.

Arteria Metatarsea Dorsalis Lateralis

The artery (Fig. 75, Amdl) is a continuation of the dorsal pedal artery. It descends along the lateral aspect of the third digit as the arteria digiti lateralis tertia (Fig. 75, Adlt). At the level of the fourth metatarsophalangeal joint it gives off the arteria digiti medialis quarta (Fig. 75, Admq). There is an anastomosis between the arteria metatarsea plantaris lateralis and the arteria metatarsea dorsalis lateralis. From this anastomosis the arteria digiti lateralis quarta (Fig. 75, Adlq) is given off which descends along the lateral aspect of the fourth digit. It supplies branches to the m. extensor digitorum brevis and the web of the foot between the third and fourth
digit. There are many arteriovenous shunts in the web. Radio-opaque substance easily passes into the veins through these arteriovenous shunts.

Arteriae Lumbosacralis

Aa. lumbosacralis

R. dorsalis

R. ventralis

The number of vessels varies from 10 to 16 and are paired. It is difficult to separate lumbar from sacral arteries because the lumbar and sacral vertebrae are ankylosed along with the last two thoracic vertebrae and the first coccygeal vertebra to form the synsacrum. There is a complete fusion of the synsacral vertebrae and the segments are indicated by the intervertebral foramina. The vessels course at first laterally and then bend dorsally around the bodies of lumbosacral vertebrae. Soon each artery divides into the ramus dorsalis and the ramus ventralis.

Ramus Dorsalis

This branch proceeds dorsally from its origin and supplies muscular and cutaneous branches to the muscles and skin over the synsacrum.

Ramus Ventralis

This branch proceeds ventrally and supplies a branch which enters the vertebral canal to contribute to the formation of the arteria spinalis ventralis. The main stem passes onto the abdominal wall and supplies branches to the abdominal muscles and abdominal skin. The
first lumbosacral artery anastomoses with the fifth caudal intercostal artery. Most of the lumbar arteries anastomose with the branches of the arteria thoracica interna.

Arteria Mesenterica Caudalis

A. mesenterica caudalis

R. cranialis

R. caudalis

The artery (Figs. 65, Amc; 67, Amc) takes its origin from the descending aorta slightly below the caudal border of the kidney and 7.5 cm caudad to the origin of the arteria ischiadica. It is an unpaired vessel, and proceeds ventrally and slightly to the left in the mesentry for a distance of 1.7 cm, and divides into the ramus cranialis and the ramus caudalis.

Ramus Cranialis

This arterial branch proceeds ventrally from its origin for 0.5 cm and then ascends cranially toward the iliocecal junction in the colic mesentry thus forming a mesenteric arc. Six to eight branches are given off this arc to the colon. It anastomoses with the iliocolic branch of the arteria mesenterica cranialis.

Ramus Caudalis

This branch proceeds caudoventrally toward the colorectum for 1 cm, coursing caudally on the terminal portion of the colorectum it
passes onto the cloaca. It supplies branches to the cloaca and caudal one-third of the colorectum. Its cloacal branches anastomose with the branches of the arteria pudenda interna.

Arteria Pudenda Communis

Descending aorta

A. pudenda communis, sinistra and dextra
A. pudenda externa
A. pudenda interna
A. sacralis mediana
A. coccygeus mediana
A. coccygeus lateralis

After the emergence of the ischiadic arteries, the abdominal aorta continues caudally as a thin vessel on the ventral aspect of the lumbosacral bony mass. Immediately below the origin of the caudal mesenteric artery the arteria pudenda communis sinistra is given off the abdominal aorta. The arteria pudenda communis dextra takes its origin 0.3 cm caudad to the origin of the left common pudendal artery. From this point the descending aorta continues caudally as the arteria sacralis mediana.

The arteria pudenda communis (Fig. 67, Apcs) is a paired vessel but does not arise from the abdominal aorta at the same level in each case. The left and right common pudendal arteries have practically the same course, mode of branching and ramification. The common pudendal artery proceeds caudolaterally passing over the depressor coccygeus
muscle. In its course it crosses the ureter and ductus deferens dorsally. One and one-half cm. laterad to its origin the vessel bifurcates into the arteria pudenda externa and the arteria pudenda interna.

Arteria Pudenda Externa

This artery (Fig. 67, Ape) proceeds laterally and cranially supplying branches; the arteriae uretodeferentiales caudalis, to the ureter, ductus deferens, and muscular branches to the m. cruratis caudalis and m. obturatorius internus.

Arteria Pudenda Interna

The artery (Fig. 67, Api) descends caudally along side the terminal part of the colorectum and follows the course of the ureter and ductus deferens. Here the artery supplies a small branch which rami- fies in the caudal portion of the ureter and ductus deferens. Two cm. laterad to its origin the vessel bifurcates, one branch winds around the phallic papilla and courses to the dorsal aspect of the cloaca and the other courses caudally on the lateral aspect of the cloaca. It supplies branches to the ureter, ductus deferens, phallic papilla, cloaca, m. retractor ani and m. eversor ureodeum.

Arteria Sacralis Mediana

The artery (Fig. 67, Asm) maintains a median position and is related to the ventral surface of the sacral bony mass. The vessel along with its collateral branches supplies branches to the m. coccygeus lateralis, m. depressor coccygeus, m. cruratis caudalis and m. levator coccygeus. The median sacral artery continues as the median
Fig. 76.--Schematic illustration of the topographic anatomy of the viscera in the female goose. SP, M. pectoralis superficialis; PP, M. pectoralis profundus; H, Heart; L, Lung; P, Proventriculus; Li, Liver; G, Gizzard; J, Jejunum; I, Ilium; D, Duodenum; C, Cloaca; SK, Skin; ST, Sternum; AM, Abdominal muscles; A, Aponeurosis.
Fig. 77.—Schematic illustration of the female genitalia in the goose. H, Heart; V, Caudal vena cava; O, ovary; I, Infundibulum; K, Kidney; A, Ampulla of the oviduct (Magnum); VL, Ventral ligament (Mesosalpinx); CO, Colon; MO, Mesovarian.

Fig. 78.—Schematic illustration of the arteries of the female genitalia in the goose. A, Aorta; As, A. suprarenalis; Ao, A. ovarica; Arcr, A. renalis cranialis; Ap, A. pelvina; Ari, A. renalis intermedius; Aocr, A. oviducta cranialis; Aoi, A. oviducta intermedius; Arc, A. renalis caudalis; Aui, A. uretodeferentiales intermedius; Aoc, A. oviducta caudalis; Amcr, A. mesenterica cranialis; Trg, Truncus gonadorenalis; Aie, A. iliaca externa; Ai, A. ischiadica; Amc, A. mesenterica caudalis; Apc, A. pudenda communis; Apil, A. pudenda interna; Ape, A. pudenda externa.
cocygeal artery and is related to the ventral surface of the cocygeal vertebrae. The median cocygeal artery along with its collateral branches supplies the tail muscles, uropygeal gland and the skin of tail region.

The Arteries of the Female Goose (Anser anser)

The sexual manifestations of the female goose differ in the right and left ovaries. Whereas the right ovary undergoes degeneration, the left increases in size and complexity soon exceeding the other in its proportion. The right ovary develops only for a short time and ultimately degenerates. In the adult female goose the internal genitalia of the left side are functional (Figs. 76, 77).

With the exception of the following variations the arterial system of the female goose is similar to that of the male goose:

1. There are no homologues for the arteria suprarenalis cranialis (Fig. 78).

2. There is a difference in the pattern of branching of the right and left gonadorenal trunks.

Truncus gonadorenalis dextra
A. suprarenalis
A. renalis cranialis

Truncus gonadorenalis sinistra
A. suprarenalis
A. ovarica
A. renalis cranialis
The arteria suprarenalis (Fig. 78, As) is similar in its course and ramification to the arteria suprarenalis caudalis of the male goose. It supplies branches to the adrenal gland.

The arteria ovarica (Fig. 78, Ao), the homologue of the arteria testicularis caudalis; varies in size and tortuousity, depending on the age and post-genital activity of the female goose. It originates from the truncus gonadorenalis sinistra and supplies slender branches to the periaortic fat, peritoneum, and the adventitia of the caudal vena cava. Medial to the ovary the artery divides into branches which course in the meso-ovarian and proceed to the ovary to supply the ovarian follicles and the ovarian parenchyma. In one female goose the descending aorta gave rise to two unpaired ovarian arteries slightly cranial to the origin of the truncus gonadorenalis.

The arteria renalis cranialis (Fig. 78, Arer) is similar to that of the male goose.

3. The arteria pelvina (Fig. 78, Ap), a branch of the arteria iliaca externa proceeds caudoventrally on the lateral boundary of the pelvic cavity and gives rise to a branch supplying the abdominal air sac, a branch which supply the intercostal muscles, and the arteria oviducta cranialis.

A. iliaca externa

A. pelvina

A. oviducta cranialis

A. glutea cranialis

R. muscularis
A. circumflexa femoris

A. femoris

The branches to the abdominal air sac and to the intercostal muscles are similar to those of the male goose.

The arteria oviducta cranialis (Fig. 78, Aocr) originates from the arteria pelvina 1.25 cm caudad to the origin of the latter and proceeds caudally in the mesosalpinx. It supplies branches to the infundibulum, magnum, isthmus and the uterus. At the level of the magnum it anastomoses with the arteria oviducta intermedius which is a branch of the arteria ischiadica.

4. The arteria ischiadica (Fig. 78, A1) divides in the following manner:

Arteria ischiadica

A. renalis intermedius

A. renalis caudalis

A. uretodeferentiales intermedius

A. oviducta intermedius

A. obturatoria

A. glutea caudalis

A. trochanterica

A. profunda femoris

A. nutriciae femoris

A. poplitea

The description of all of the aforementioned arteries with the exception of the arteria oviducta intermedius is similar to those of the male goose. The arteria oviducta intermedius (Fig. 78, Aoi),
originates from the arteria ischiadica at the level of origin of the arteria renalis caudalis. It proceeds caudally in the mesosalpinx and divides into the ramus cranialis and the ramus caudalis.

The ramus cranialis courses cranially in the mesosalpinx and supplies branches to the infundibulum and magnum. It anastomoses with the arteria oviducta cranialis which is a branch of the arteria pelvina.

The caudal ramus descends caudally and supplies branches to the magnum, isthmus and uterus. It anastomoses with the arteria oviducta caudalis which is a branch of the arteria pudenda externa sinistra.

5. The arteria pudenda externa sinistra proceeds laterocranially from its origin and gives off a vessel, the arteria oviducta caudalis (Fig. 78, Aoc) at the level of the uterus. The main vessel supplies branches to the ureter, m. cruratis caudalis and m. obturatorius internus.

The arteria oviducta caudalis proceeds toward the uterus and supplies branches to the uterus and cloaca. It anastomoses with the arteria oviducta intermedius.

6. The arteriae uretodeferentialis supply the ureter only because the ductus deferens is absent in the female.

The Arteries of the Male Duck (Anas platyrhynchos)

Aorta

The ascending aorta (Fig. 79) of the duck is 0.5 cm in length and is similar to that of the goose in its pattern of origin.
Fig. 79.—Schematic illustration of the major branches of the truncus brachiocephalicus. Rpe, R. pectoralis; Ac, A. clavicularis; Asc, A. sternoclavicularis; Atc, A. thoracica communis; Ati, A. thoracica interna; Rd, R. dorsalis; Rv, R. ventralis; Asu, A. subclavia; A, Aorta; H, Heart; L, Liver; Lu, Lung; Rp, R. pericardiophrenica; Atec, A. thoracica externa caudalis; Atel, A. thoracica externa lateralis; Aa, A. axillaris; As, A. sternalis; Acc, A. carotis communis; S, Syrinx; T, Trachea.
Aorta

A. coronaria dextra

R. superficialis dextra
R. atrialis
R. ventricularis
R. profunda dextra
R. proximalis
R. distalis

A. coronaria sinistra

R. profunda sinistra
R. superficialis sinistra
R. proximalis
R. distalis

The arteria coronaria dextra and the arteria coronaria sinistra arise from the right aortic sinus and the left aortic sinus respectively; their mode of branching and ramification is similar to the corresponding vessels of the goose.

The arch of the aorta (Fig. 79) is 1.4 cm in length and lies transverse to the long axis of the body at the level of the first thoracic vertebra. The truncus brachiocephalicus sinistra (Fig. 79) arises from the arcus aortae at the level of the first thoracic vertebra and forms an angle of 120 degrees with the ascending aorta. The truncus brachiocephalicus dextra (Fig. 79) takes its origin from the arcus aortae 0.3 cm to the right and laterad to the origin of the left trunk, and forms an angle of 30 degrees with the arch of the aorta.
Fig. 80.—The branches of the arteria carotis externa. Am, A. maxillaris; Ac, A. carotis interna; Acc, A. carotis communis; Ace, A. carotis externa; Aed, A. esophagea descendens; As, A. sublingualis; Ama, A. mandibularis; Aam, A. alveolaris mandibulae; Ap, A. palatina; Af, A. facialis.

Fig. 81.—The branches of the arteria carotis interna. Ae, A. ethmoidea; Aoi, A. ophthalmica interna; Ro, R. oralis; Ra, R. aboralis; Acen, A. cerebelli nasalis; Acea, A. cerebelli aboralis; Av, A. vertebralis cranialis; Aci, A. carotis interna; Rp, R. profundus; Ao, A. occipitalis; Aoe, A. ophthalmica externa; Acp, A. cerebri profunda; Afs, A. fossae sylvii; Acn, A. cerebri nasalis.

Fig. 82.—The branches of the arteria carotis communis at the level of the thyroid gland. Aea, A. esophagea ascendens; Rth, R. thyroidea; Rt, R. trachealis; Rb, R. bronchialis; Rf, R. fascialis; Atb, A. thyrobronchialis; Acc, A. carotis communis; Atca, A. thyroidea caudalis; Al, A. lateralis; Rm, R. muscularis; Rc, R. cutaneus; Acnv, A. comes nervi vagi; Atc, A. thyroidea cranialis.

Fig. 83.—Schematic illustration of the arteria carotis communis and the arteria thoracica communis. Ace, A. carotis externa; Aea, A. esophagea ascendens; Acc, A. carotis communis; Aa, A. axillaris; Atel, A. thoracica externa lateralis; Atec, A. thoracica externa caudalis; Ati, A. thoracica interna; Acnv, A. comes nervi vagi; Avc, A. vertebralis communis; Rl, R. lateralis; Rc, R. cutaneus; Asc, A. subcutanea colli; Ac, A. carotis interna.
Arcus aorta.

Truncus brachiocephalicus sinistra et dextra

A. carotis communis
A. subclavia

With the exception of the following variations the right and the left brachiocephalic trunks of the duck are similar in their pattern of branching to the corresponding trunks of the goose:

1. The arteria carotis communis arises 2.6 cm laterad to the origin of the truncus brachiocephalicus sinistra (Fig. 79).
2. The arteria carotis communis arises 1.7 cm laterad to the origin of the truncus brachiocephalicus dextra (Fig. 79).

Arteria Carotis Communis

A. carotis communis

A. thyrobronchialis
  R. trachealis
  R. thyroideus
  R. bronchialis
  R. fascialis
A. comes nervi vagi
  A. thyroidea caudalis
  A. esophagea ascendens
    A. thyroidea cranialis
  R. lateralis
  R. cranialis
A. vertebralis communis
A. lateralis
R. muscularis
R. cutaneus
A. vertebralis cranialis
R. dorsalis
R. ventralis
A. vertebralis caudalis
A. intercostalis cranialis prima et secunda
R. dorsalis
R. ventralis
A. subcutanea colli
R. cranialis
R. caudalis
A. carotis externa
A. carotis interna

The arteria carotis communis (Figs. 79, Acc; 82, Acc; 83, Acc) has the same course and termination as that of the goose. Its collateral branches present the following features:

The arteria thyrobronchialis (Fig. 82, Atb) originates from the lateral wall of the arteria carotis communis 2.5 cm craniad to the origin of the latter and resembles in the arrangement of its branches that of the goose.

The arteria comes nervi vagi (Fig. 83, Acnv) takes its origin from the lateral wall of the arteria carotis communis at the level of the thyroid gland and opposite to the origin of the arteria thyrobronchialis. In one case it arose by a common trunk with the arteria
vertebralis communis from the arteria carotis communis. It has the same basic pattern of branching as that of the goose.

The arteria vertebralis communis (Fig. 83, Avc) originates from the dorsal wall of the arteria carotis communis slightly cranial to the origin of the arteria comes nervi vagi. It may arise by a common trunk with the arteria comes nervi vagi at the thyroid gland. The artery proceeds laterally and soon gives rise to the arteria lateralis (Fig. 82, Al). The main trunk of the arteria vertebralis communis turns medially and enters the canalis transversarium at the level of the 12th cervical vertebra. In the canalis transversarium it presents no differential features in its pattern of branching and course from that of the goose.

The arteria lateralis (Fig. 82, Al) arises from the arteria vertebralis communis and proceeds toward the shoulder joint. It divides into the ramus muscularis and the ramus cutaneus. The ramus muscularis is the continuation of the arteria lateralis and supply the muscles of the shoulder joint. The ramus cutaneus proceeds cranially and is lost in the subcutaneous fat of the neck.

The arteria subcutanea colli (Fig. 83, Asc) resembles that of the goose in its course and relations.

Arteria Carotis Externa

A. carotis externa

A. esophagea descendens

R. esophageus

R. trachealis
A. mandibularis
A. laryngea
A. alveolaris mandibulae
A. sublingualis
A. lingualis
A. palatina
A. maxillaris
A. auricularis
A. pterygoidea
A. facialis

The arteria carotis externa (Figs. 80, Ace; 83, Ace) arises from
the arteria carotis communis 0.6 cm craniad to the origin of the arteria
subcutanea colli at the level of the atlas. It resembles that of the
goose in its course, distribution and relations.

Arteria Carotis Interna

A. carotis interna
A. occipitalis
R. cutaneus
R. muscularis
R. superficialis
R. profundus
A. ophthalmica externa
Plexus temporalis
A. temporalis
A. alveolaris inferior
A. sphenoidae
A. sphenomaxillaris
A. carotis cerebralis
A. ophthalmica interna
R. oralis
A. cerebri profundus
A. fossae sylvii
A. cerebri nasalis
A. ethmoidea
R. aboralis
A. cerebelli nasalis
A. basilaris cerebri
A. cerebelli aboralis

The arteria carotis interna originates from the arteria carotis communis 0.6 cm cranial to the origin of the arteria subcutanea colli, and has the same basic pattern of branching and relations as that of the goose.

Arteria subclavia

A. subclavia
A. sternoclavicularis
R. pericardiophrenicus
A. axillaris
A. thoracica communis

The arteria subclavia (Figs. 79, Asu; 86, As) is the laterad continuation of the truncus brachiocephalicus following the origin of
the arteria carotis communis. It has the same basic pattern of branching and ramification as that of the goose with the exception of the following variations:

1. Arteria Sternoclavicularis

A. sternoclavicularis
R. pectoralis
A. sternalis
A. clavicularis

The arteria sternoclavicularis (Fig. 79, Asc) arises from the ventrocaudal wall of the arteria subclavia 0.2 cm laterad to the origin of the arteria carotis communis and 0.6 cm mediad to the origin of the arteria axillaris. It has three branches. The course and targets of these branches are similar to the corresponding vessels of the goose.

2. The ramus pericardiophrenicus (Fig. 79, Rp) is given off the ventral wall of the arteria subclavia 0.3 cm laterad to the origin of the arteria sternoclavicularis. Its mode of branching and ramification is comparable to that of the goose.

3. The arteria axillaris (Fig. 79, Aa) is derived from the cranial wall of the arteria subclavia 0.8 cm laterad to the origin of the arteria carotis communis.

4. Arteria Thoracica Communis

The arteria thoracica communis (Fig. 79, Atc) is 0.6 cm in length and has the same basic pattern of branching as that of the goose.
A. thoracica communis
A. thoracica interna
R. dorsalis
R. ventralis
A. thoracica externa communis
A. thoracica externa lateralis
A. thoracica externa lateralis cranialis
A. thoracica externa lateralis caudalis
A. thoracica externa caudalis
A. thoracica externa caudalis dorsalis
R. muscularis
R. cutaneus
A. thoracica externa caudalis ventralis

5. The arteria thoracica interna (Fig. 79, Ati) arises from the ventral wall of the arteria thoracica communis 0.4 cm laterad to the origin of the arteria axillaris.

6. The arteria thoracica externa communis (Fig. 85, Atec) bifurcates into the arteria thoracica externa lateralis (Fig. 83, Atel; 85, Atel) and the arteria thoracica externa caudalis (Fig. 83, Atec) 0.3 cm laterad to the origin of the arteria thoracica interna.

7. The arteria thoracica externa caudalis dorsalis (Fig. 85, Atecd) takes its origin from the arteria thoracica externa caudalis 1.2 cm dorsocaudad to the bifurcation of the arteria thoracica externa communis. It is comparatively smaller in diameter than that of the goose.
Arteria Axillaris

A. axillaris
  A. acromialis
  A. coracoscapularis
  A. scapularis
  A. coracoidea
A. profunda brachii
  A. collateralis radialis
  A. collateralis ulnaris
A. brachialis
  A. circumflexa humeralis
  A. nutriciae humeralis
  A. radialis
    R. muscularis
      A. recurrens radialis
      A. indicis
      A. metacarpea quarta
A. ulnaris
  R. muscularis
  A. recurrens ulnaris
  A. metacarpea tertia
Rete cubitus caudalis

The arteria axillaris (Figs. 79, Aa; 86, A) takes its origin from the arteria subclavia and gives off the arteria acromialis (Fig. 86, Aa) 0.4 cm laterad to the origin of the former. The arteria coracoscapularis (Fig. 86, Acs) originates from the arteria axillaris 1 cm laterad
to the origin of the latter. Further down the pectoral limb, the artery pursues similar course and has the same termination and collateral branches as in the goose.

Aorta Descendens

Aorta descendens

A. intercostalis caudalis (Paired)
A. celiaca (Unpaired)
A. mesenterica cranialis (Unpaired)

Truncus gonadorenalis (Paired)
A. iliaca externa (Paired)
A. ischiadica (Paired)
A. lumbosacralis (Paired)
A. mesenterica caudalis (Unpaired)
A. pudenda communis (Paired)
A. sacralis mediana (Unpaired)

The aorta descendens (Figs. 79, A; 87, A; 88, A) pursues a similar course in the body cavity to that of the goose, and has the same basic pattern of branching with the exception of the arteira suprarenalis cranialis and the arteira testicularis cranialis which are not found in the duck.

Arteria Intercostalis Caudalis

A. intercostalis caudalis

R. dorsalis
R. ventralis
Fig. 84.---Schematic illustration of the cutaneous arteries in the pectoral region. Ventral view. PS, M. pectoralis superficialis; 1, Cutaneous branch of the A. thoracica externa lateralis; 2, Cutaneous branch of the A. thoracica externa caudalis ventralis; 3, Cutaneous branch of the A. thoracica externa caudalis dorsalis.

Fig. 85.---The distribution of the arteria thoracica externa communis. Ate, A. thoracica externa communis; Atel, A. thoracica externa lateralis; Atelcr, A. thoracica externa lateralis cranialis; Atelc, A. thoracica externa lateralis caudalis; Atencv, A. thoracica externa caudalis ventralis; Rc, R. cutaneus; Ated, A. thoracica externa caudalis dorsalis; S, Skin; Rm, R. muscularis; OAE, M. obliquus abdominis externus; CBV, M. coracobrachialis ventralis; PP, M. pectoralis profundus; As, A. sternalis; PS, M. pectoralis superficialis.
Fig. 86.—Schematic illustration of the arteries of the wing. Acc, A. carotis communis; A, A. axillaris; Acs, A. coracoscapularis; Acha, A. circumflexa humeralis; Au, A. ulnaris; Ar, A. radialis; Al, A. indicis; Amd, A. digitii quarta; Amv, A. digitii tertia; Arr, A. recurrens radialis; Aru, A. recurrens ulnaris; Rm, R. muscularis; Acr, A. collateralis radialis; Acu, A. collateralis ulnaris; Anh, A. nutritiae humeralis; Apb, A. profunda brachii; Aa, A. acromialis; As, A. subclavia; B, Truncus brachiocephalicus.
Five pairs of caudal intercostal arteries arise from the descending aorta in the vicinity of the fifth, sixth and seventh thoracic vertebra. These arterial branches have the same course, termination and relations as that of the goose.

Arteria Celiaca

A. celiaca

A. proventriculus
- Ascending branch
- Descending branch

A. gastrica sinistra
- R. proventriculus
- R. hepaticus
- A. hepatica sinistra
- R. dorsalis
- R. ventralis

A. gastrica dextra
- Aa. lienalis
- A. hepatica dextra
- R. doudenalis
- R. hepaticus dextra

A. iliocecalis sinistra
- A. iliocecalis sinistra cranialis

A. pancreaticoduodenalis
- R. pancreaticus

A. iliocecalis sinistra caudalis
Fig. 87.—Schematic illustration of the arteria celiaca. A, Aorta; Agd, A. gastrica dextra; Ags, A. gastrica sinistra; Rh, R. hepaticus; Ahs, A. hepatica sinistra; G, Gizzard; L, Liver; Rv, R. ventralis; Rd, R. dorsalis; Rp, R. proventriculus; Ap, A. proventriculus; Ac, A. celiaca; H, Heart.

Fig. 88.—Schematic illustration of the arteria celiaca. A, Aorta; Agd, A. gastrica dextra; Ahd, A. hepatica dextra; Rh, R. hepaticus; Aicsc, A. ileocecalis sinistra cranialis; Rp, R. pancreaticus; Aicsca, A. ileocecalis sinistra caudalis; Apd, A. pancreaticoduodenalis; Agdo, A. gastrica dorsalis; Agv, A. gastrica ventralis; Alca, A. lienalis caudalis; Alc, A. lienalis cranialis; Ags, A. gastrica sinistra; Ac, A. celiaca.
A. gastrica dorsalis

A. gastrica ventralis

The arteria celiaca (Figs. 87, Ac; 88, Ac) is an unpaired vessel which arises from the ventral wall of the descending aorta at the level of the cranial end of the fifth thoracic vertebra and pursues a course similar to that of the goose. The chief differences in its branching are as follows:

1. The arteria celiaca courses caudoventrally and to the left giving off a vessel, the arteria proventriculus (Fig. 87, Ap), 0.3 cm caudad to its origin. The arteria proventriculus divides into a small ascending branch and a descending branch. The ascending branch courses on the right lateral aspect of the cranial one-third of the proventriculus and the distal portion of the esophagus. The descending branch is larger in diameter than the ascending vessel and passes caudally on the dorsal wall of the proventriculus. It furnishes branches to the proventriculus and anastomoses with the ramus proventriculus.

2. The main trunk bifurcates into the arteria gastrica sinistra and the arteria gastrica dextra 2 cm caudoventrad to its origin and at the level of the middle one-third of the proventriculus.

3. The arteria gastrica sinistra (Figs. 87, Ags; 88, Ags) resembles that of the goose in its course, relation, and pattern of collateral and terminal branches.
4. The arteria gastrica dextra (Figs. 87, Agd; 88, Agd) pursues a course similar to that of the goose along the right ventral aspect of the proventriculus and the ventral surface of the spleen. The chief differential features in its branches are as follows:

At the level of the spleen it gives off two branches, the arteria lienalis cranialis (Fig. 88, Alc) and the arteria lienalis caudalis (Fig. 88, Alca). These two vessels leave the arteria gastrica dextra at right angles and enter the spleen 0.6 cm apart.

The arteria hepatica dextra (Fig. 88, Ahd) arises from the arteria gastrica dextra opposite the origin of the arteria lienalis caudalis and resembles that of the goose in its course and arrangement of the branches.

The ramus hepaticus dextra (Fig. 88, Rh) originates from the arteria gastrica dextra 0.7 cm caudad to the origin of the arteria hepatica dextra and enters the visceral surface of the right lobe of the liver. It supplies branches to the gall bladder.

The arteria iliocoealisis sinistra cranialis (Fig. 88, Aicsc) arises from the arteria gastrica dextra 1 cm caudad to the origin of the ramus hepaticus dextra and is similar in its course, pattern of branching, and relations to that of the goose.

The arteria pancreaticoduodenalis (Fig. 88, Apd) originates from the arteria gastrica dextra 0.4 cm caudad to the origin of the arteria iliocoealisis sinistra cranialis. The ramus pancreaticus (Fig. 88, Rp) is given off the arteria pancreaticoduodenalis 0.2 cm caudad to the trifurcation of the arteria gastrica dextra. This ramus is like that of the goose in its course and termination. The course and pattern of
branching of the arteria pancreaticoduodenalis is similar to that of the goose with the exception of a new vessel, the arteria iliocecalis sinistra caudalis (Fig. 88, Aicsca), which arises 1 cm caudad to the area of trifurcation of the arteria gastrica dextra. The arteria iliocecalis sinistra caudalis enters the mesentry between the ilium and the cecum, and supplies branches to the caudal portion of the cecum and the adjoining portion of the ilium. The arteria gastrica dorsalis (Fig. 88, Agdo) and the arteria gastrica ventralis (Fig. 68, Agv) resembles those of the goose in their course and relations. They may arise by a common stem from the arteria gastrica dextra.

Arteria Mesenterica Cranialis

A. mesenterica cranialis
A. jejunoduodenalis
A. iliocolica
A. iliocecalis dextra
Aa.jejunalis
Aa. ilei

The arteria mesenterica cranialis (Fig. 89, Amc) originates from the ventral wall of the descending aorta 1.2 cm caudad to the origin of the arteria celiaca. It proceeds ventrocaudally in the mesentry and gives rise to the arteria jejunoduodenalis 2.4 cm caudad to its origin; the arteria iliocolica arises immediately behind the origin of the arteria jejunoduodenalis and 2.5 cm caudad to the origin of the arteria mesenterica cranialis. The main trunk continues ventrocaudally and gives off the arteria iliocecalis dextra 1 cm caudad to the origin of
Fig. 89.-- Schematic illustration of the branches of the descending aorta. Aj, A. jejunalis; Tgr, Truncus gonadorenalis; Aie, A. iliaca externa; Agc, A. glutea cranialis; Acf, A. circumflexa femoris; Af, A. femoris; Rm, R. muscularis; Ap, A. pelvina; Ari, A. renalis intermedius; Arc, A. renalis caudalis; Ap, A. pudenda communis; Amca, A. mesenterica caudalis; Ai, A. ischiadica; Aicd, A. iliocolica dextra; Ail, A. ilsi; Adg, A. jejunoduodenalis; Aic, A. iliocolica; Amc, A. mesenterica cranialis; Ac, A. celiaca.
the arteria iliocolica. Following the origin of the arteria iliocolica dextra it divides into the arteriae jejunales, and the arteriae ilei in the loops of the small intestine.

Arteria Jejunoduodenalis

The vessel (Fig. 89, Adg) arises from the arteria mesenterica cranialis 2.4 cm caudad to the origin of the latter. It resembles that of the goose in its course and relations.

Arteria Iliocolica

The arteria iliocolica (Fig. 89, Aic) originates from the arteria mesenterica cranialis immediately following the origin of the arteria jejunoduodenalis. It is similar in its course and relations to the ramus iliocolicus of the goose except that it supplies branches to the origin of the left cecum in addition to the caudal portion of the ilium and the cranial portion of the colon.

Arteria Iliocecalis Dextra

The artery (Fig. 89, Aicd) arises from the arteria mesenterica cranialis 3.5 cm caudad to the origin of the latter and 1 cm caudad to the origin of the arteria iliocolica. It pursues a course similar to the ramus iliocecalis and has similar relations.

Arteriae Jejunales

These vessels (Fig. 89, Aj) resemble in arrangement those of the goose.
Arteriae Ilei

The arteriae ilei (Fig. 89, Ail) have the same course and termination as in the goose.

There are no corresponding vessels to the arteria suprarenalis cranialis and the arteria testicularis cranialis in the duck.

Truncus Gonadorenalis

The truncus gonadorenalis (Fig. 89, Tgr) has the same basic pattern of branching as that of the goose. Since there are no corresponding vessels to the arteria suprarenalis cranialis and the arteria testicularis cranialis in the duck, the terms used in the goose cannot be applied in the duck. The terms used in the duck are as follows:

Truncus gonadorenalis

A. suprarenalis
A. testicularis
A. renalis cranialis

The truncus gonadorenalis (Fig. 89, Tgr) is a paired vessel. The right trunk originates from the ventral wall of the descending aorta slightly cranial to the left trunk and 1.3 cm caudad to the origin of the arteria mesenterica cranialis; the left trunk arises from the descending aorta 0.2 cm caudad to the right trunk. On the ventral aspect of the cranial lobe of the kidney it divides into the following branches:

1. A. suprarenalis
2. A. testicularis
3. A. renalis cranialis
Arteria Suprarenalis

This vessel pursues the same course as the arteria suprarenalis caudalis of the goose and supplies the adrenal gland.

Arteria Testicularis

This arterial branch resembles the arteria testicularis caudalis of the goose and has the same course and termination. It supplies the testis.

Arteria Renalis Cranialis

The arteria renalis cranialis is like that of the goose in its course and relations.

Arteria Iliaca Externa

A. iliaca externa

A. pelvina
A. glutea cranialis
R. muscularis
A. circumflexa femoris
A. femoris

This paired vessel (Fig. 89, Aie) arises from the lateral wall of the descending aorta 1 cm caudad to the origin of the truncus gonadorenalis. It resembles that of the goose in its course. Laterally 0.7 cm from its origin it gives off the arteria pelvina. The main trunk continues laterally and gives rise to the arteria glutea cranialis 0.8 cm laterad to the origin of the arteria pelvina. The ramus muscularis originates from the external iliac artery 0.2 cm laterad to the origin
of the arteria glutea cranialis, and 0.6 cm laterad to the origin of
the ramus muscularis the main trunk bifurcates into the arteria circum-
flexa femoris and the arteria femoris.

Arteria Pelvina

This vessel (Fig. 89, Ap) resembles that of the goose in its
course and relations.

Arteria Glutea Cranialis

This arterial branch (Fig. 89, Agc) is the same as that of the
goose.

Ramus Muscularis

The ramus muscularis (Fig. 89, Rm) is like that of the goose.

Arteria Circumflexa Femoris

The vessel (Fig. 89, Acf) pursues a course similar to that of the
goose and has the same basic pattern of branching.

Arteria Femoris

This artery (Fig. 89, Af) is similar to that of the goose.

Arteria Ischiadica

A. ischiadica

A. renalis intermedius

A. renalis caudalis

A. uretodeferentiales intermedius

A. obturatoria
Fig. 90.—Schematic illustration of the artery ischiatric. Ai, A. ischiadica; Agc, A. glutea caudalis; Apf, A. profunda femoris; Afc, A. femoris caudalis; Atp, A. tibialis posterior; Ata, A. tibialis anterior; Rt, R. tibialis; Ampm, A. metatarsalplanaris medialis; Adp, A. dorsalis pedis; Amdm, A. metatarsalplanaris dorsalis medialis; Aml, A. digiti prima; Adm, A. digiti medialis secunda; Adl, A. digiti lateralis secunda; Amdl, A. metatarsalplanaris dorsalis lateralis; Ampl, A. metatarsalplanaris plantaris lateralis; Atl, A. tibialis lateralis; Apr, A. peronealis; Atm, A. tibialis medialis; Ags, A. genus supreme; Ap, A. poplitea; Anf, A. nutriciae femoris; At, A. trochanterica; Ao, A. obturatoria.
A. glutea caudalis
A. trochanterica
A. profunda femoris
A. nutritiae femoris
A. poplitea
  A. femoris caudalis
A. tibialis posterior
A. genus supreme
A. tibialis medialis
A. peronea
A. tibialis lateralis
  R. tibialis
  R. fibularis
A. tibialis anterior
  A. recurrens tibialis anterior
Rete tarsi
A. dorsalis pedis
  A. metatarsea plantaris communis
    A. metatarsea plantaris medialis
    R. proximalis medialis
    R. distalis medialis
  A. metatarsea plantaris lateralis
    R. proximalis lateralis
    R. distalis lateralis
A. metatarsea dorsalis medialis
A. digit i prima
A. digitii laterales secunda
A. digitii medialis secunda
A. digitii medialis tercia
A. metatarsae dorsalis lateralis
A. digitii laterales tercia
A. digitii medialis quarta
A. digitii laterales quarta

The ischiadic artery (Fig. 89, A1) pursues the same course and presents a similar basic pattern of branching in the body cavity as that of the goose with the following exceptions:

1. The artery originates from the lateral wall of the descending aorta 1.9 cm caudad to the origin of the arteria iliaca externa.

2. The arteria renalis intermedia (Fig. 89, A1r) and the arteria renalis caudalis (Fig. 89, Arc) are given off from the arteria ischiadica 0.5 cm latero-caudally from the origin of the latter.

3. The arteria uretodeferentiales intermediae originates from the arteria renalis caudalis.

The main trunk continues laterally in the body cavity beyond the kidney and 1 cm laterad to the origin of the arteria renalis caudalis it gives rise to the arteria obturatoria and the arteria glutea caudalis.

The vessel passes through the ischiadic foramen and proceeds distally along with the ischiadic nerve. It resembles that of the goose in its relations, course and branchings.
Arteriae Lumbosacralis

A. lumbosacralis

R. dorsalis

R. ventralis

The number of vessels varies from 10 to 16 and has the same course and termination as in the goose.

Arteria Mesenterica Caudalis

A. mesenterica caudalis

R. cranialis

R. caudalis

The artery (Fig. 89, Amca) usually takes its origin from the ventral wall of the descending aorta 3.5 cm caudad to the origin of the arteria ischiadica, but in one male duck it arose from the arteria pudenda communis dextra immediately caudad to the origin of the latter. The arteria mesenterica caudalis proceeds ventrally in the mesentry and divides 0.5 cm beyond its origin into the ramus cranialis and the ramus caudalis.

The ramus cranialis and the ramus caudalis have a similar course and termination as that of the goose and present no differential feature.

Arteria Pudenda Communis

Aorta descendens

A. pudenda communis, sinistra et dextra
A. pudenda externa
A. pudenda interna
A. sacralis mediana
A. coccygeus mediana
Aa. coccygeus lateralis

The arteria pudenda communis dextra (Fig. 89, Apc) arises from the lateral wall of the descending aorta usually immediately below the origin of the arteria mesenterica caudalis but the latter has been observed arising as a branch of the arteria pudenda communis dextra in one male duck. The arteria pudenda communis sinistra originates from the lateral wall of the descending aorta 0.2 cm caudad to the origin of the arteria pudenda communis dextra. Following the origin of the arteria pudenda communis sinistra, the descending aorta continues as the arteria sacralis mediana.

The arteria pudenda communis dextra and the arteria pudenda communis sinistra resemble in arrangement, course, branching, relations and termination that of the goose with one exception of the former which has been described previously.

The arteria sacralis mediana is like that of the goose. Its collateral branches present no special feature.

**The Arteries of the Female Duck (Anas platyrhynchos)**

The sexual manifestations of the female duck (Fig. 92) are similar to that of the female goose. In the adult female duck, the genitalia of the left side are functional. The arteries of the female duck (Fig. 91) are arranged as in the female goose. A few special features may be noted.
Fig. 91.—The arteries of the female genitalia in the duck. 
As, A. suprarenalis; Arcr, A. renalis cranialis; Aie, A. iliaca 
externa; Ari, A. renalis intermedius; Ai, A. ischiadica; Arc, A. 
renalis caudalis; Amc, A. mesenterica caudalis; Aoc, A. oviducta 
caudalis; Aoi, A. oviducta intermedius; Aocr, A. oviducta cranialis; 
Ap, A. pelvina; Aoca, A. ovarica caudalis; Aoc, A. ovarica cranialis.

Fig. 92.—Schematic illustration of the female genitalia. A, 
Aorta; S, Suprarenal gland; R, Rectum; U, Uterus; A, Ampulla of the 
oviduct; I, Infundibulam; Amcr, A. mesenterica cranialis; Ac, A. 
celiaca.
The ovary is supplied by two arteries, the arteria ovarica cranialis (Fig. 91, Aoc) and the arteria ovarica caudalis (Fig. 91, Aoca), the former vessel takes its origin directly from the descending aorta slightly cranial to the suprarenal gland, and the latter originates from the truncus gonadorenalis sinistra.
DISCUSSION

The arteries of the domestic turkey (Meleagris gallopavo) are similar in their pattern of branching to those of the chicken (Gallus domesticus), and the arteries of the domestic goose (Anser anser) are comparable to those of the domestic duck (Anas platyrhynchos). There are a few species differences in the order galliformes and the order anseriformes which have been described separately under the heading "Results".

There are some order differences as regards the origin, course and pattern of branching of the arteries of the birds covered in this study, and these are as follows:

The arteries of the head and neck of the birds belonging to the order galliformes are arranged such as in the birds of the order anseriformes. A few special features may be noted.

1. The arteria thyrotrachealis described in the order galliformes is absent in the order anseriformes. The area supplied by the arteria thyrotrachealis in the turkey, is supplied by the arteria thyrotrachealis and the arteria bronchialis in the chicken. The corresponding area in the order anseriformes is supplied by the arteria thyrobronchialis.

2. The arteria comes nervi vagi originates from the arteria vertebralis communis in the order galliformes, but the artery arises independently from the arteria carotis communis at the level of origin of the arteria vertebralis communis in the order anseriformes.

286
3. The arteria lateralis originates from the arteria vertebralis communis in the turkey, but in the chicken this artery is absent, and the area supplies by the artery in the turkey is nourished by the ramus muscularis and the ramus cutaneus in the chicken. In the goose the arteria lateralis arises from the arteria comes nervi vagi and has the same course as in the turkey. The arteria lateralis in the duck is similar to that of the turkey as regards to its origin and course.

4. The arteria vertebralis caudalis gives rise to four pairs of arteriae intercostales cranialis in the order galliformes where as in the order anseriformes the arteria vertebralis caudalis gives rise to two pairs of arteriae intercostales cranialis.

5. The arteria subcutanea colli arises from the arteria carotis communis in the turkey, goose and the duck, but in the chicken it originates from the arteria comes nervi vagi.

6. The arteria occipitalis of the turkey arises from the arteria carotis communis slightly caudad to the bifurcation of the latter, but in the chicken, this artery usually branches off the arteria carotis externa. In the order anseriformes the artery usually arises from the arteria carotis interna.

7. The arteria carotis externa and the arteria carotis interna are similar in all the species of birds studied as regards to their origin, course and mode of branching with the exception of the origin of the arteria occipitalis which has been previously mentioned.
In the order galliformes, the arteria subclavia usually gives rise to the arteria thyrotrachealis, arteria sternoclavicularis, arteria axillaris, arteria acromialis and the arteria thoracica communis, but in the order anseriformes, the arteria subclavia gives rise to the arteria sternoclavicularis, ramus pericardiophrenica, arteria axillaris and the arteria thoracica communis.

The differential features of the arteria thyrotrachealis has been described earlier.

The arteria sternoclavicularis divides into the arteria subcostalis, arteria sternalis and the arteria clavicularis in the order galliformes, but in the order anseriformes, the artery divides into the ramus pectoralis, arteria sternalis and the arteria clavicularis.

The arteria sternalis and the arteria clavicularis in the order galliformes resemble those of the order anseriformes in their course and relations. The arteria subcostalis is absent in the birds of the order anseriformes, and the area supplied by the artery in the order galliformes is supplied by the arteria thoracica interna in the order anseriformes.

The ramus pectoralis is absent in the birds of the order galliformes and the area supplied by the artery in the latter is supplied by the arteria thoracica externa in the order anseriformes.

Ramus pericardiophrenica could not be traced in the birds of the order galliformes.
The arteria thoracica communis in the order galliformes is similar to that of the order anseriformes with the exception of the following variation in its branches:

In the order galliformes, the arteria thoracica externa communis divides into the arteria thoracica externa ventralis, arteria thoracica externa dorsalis and the arteria thoracica externa lateralis, whereas in the order anseriformes, the arteria thoracica externa communis bifurcates into the arteria thoracica externa lateralis and the arteria thoracica externa caudalis. The area supplied by the arteria thoracica externa ventralis in the order galliformes is supplied by the arteria thoracica externa caudalis ventralis in the order anseriformes.

The arteries of the pectoral limbs in the birds of the order galliformes are arranged such as in the birds of the order anseriformes. A few special features are noted.

1. The arteria axillaris, in the order anseriformes, gives rise to the arteria acromialis in addition to other branches arising from the artery in the order galliformes. Usually the arteria acromialis arises from the arteria subclavia in the order galliformes.

2. In the order anseriformes, the arteria radialis gives rise to the arteria indicis and the arteria metacarpea quarta, whereas these vessels are given off the arteria ulnaris in the birds of the order galliformes. The arteria indicis and the arteria metacarpea quarta resembles those of the order galliformes.

3. The arteria ulnaris, in the order galliformes, gives rise to the arteria recurrens ulnaris, arteria indicis, arteria metacarpea
tertia and the arteria metacarpea quarta, whereas in the order anseriformes, the artery gives rise to the arteria recurrens ulnaris, ramus muscularis and the arteria metacarpea tertia.

In the order galliformes, the major branches of the descending aorta resemble in general disposition those of the order anseriformes. Only the most important differential features of the arrangement of the vessels are compared.

1. Two pairs of arteriae intercostales caudalis are present in the birds of the order galliformes whereas five pairs of arteriae intercostales caudalis arise from the descending aorta in the order anseriformes.

2. The arteria celiaca, in the order galliformes, gives rise to the ramus esophageus and two arteriae proventriculus, whereas in the order anseriformes, the artery gives off three arteriae proventriculus.

The arteria gastrica sinistra, in the order galliformes, resembles in its general disposition that of the order anseriformes with the exception of the ramus intermedius which is present in the chicken and absent in all the other species of birds studied.

The arteria gastrica dextra in the order galliformes gives off two to three arteriae iliocecalis sinistra, whereas in the order anseriformes, the artery gives rise to a single arteria iliocecalis sinistra.

In the turkey the arteria gastrica communis is given off the arteria gastrica dextra which in turn bifurcates into the arteria gastrica dorsalis and the arteria gastrica ventralis, whereas in the
chicken, the arteria gastrica dorsalis leaves the arteria gastrica dextra at the level of the ventriculus. In the order anseriformes, the arteria gastrica dextra trifurcates into the arteria pancreaticoduodenalis, arteria gastrica dorsalis and the arteria gastrica ventralis.

3. With the exception of the following variations, the arteria mesenterica cranialis in the birds of the order galliformes has the same basic pattern of branching as that of the order anseriformes.

   In the domestic goose, the arteria ilioccecalis dextra gives rise to the ramus iliocolicus and the ramus ilioccecalis. The ramus iliocolicus is comparable to the arteria iliocolica of the duck, turkey and chicken. The ramus ilioccecalis of the goose resembles in its pattern of branching the arteria ilioccecalis dextra of the duck, turkey and chicken.

4. The arteria suprarenalis arises from the first lumbar artery in the turkey and chicken, from the descending aorta in the goose, but in the duck the suprarenal vessel arises from the truncus gonadorenalis.

5. The arteria mesenterica caudalis, in the turkey, forms an arc in the colic mesentry and secondary branches arise from the arc, but in the case of chicken, goose and duck the artery bifurcates into the ramus cranialis and the ramus caudalis.

6. The arteria iliaca externa in the birds of the order galliformes has the same course and termination as in the order anseriformes. Its collateral branches present the following special features:

   The arteria glutea cranialis, in the order galliformes, originates prior to the origin of the arteria pelvina, whereas in the order anseriformes the relation between the two arteries is reverse.
The ramus muscularis, a branch of the arteria iliaca externa in the order anseriformes, is absent in the order galliformes. The structures supplied by the artery in the order anseriformes are supplied by the branches of the arteria circumflexa femoris and the arteria femoris in the order galliformes.

The arteria pelvina, arteria glutea cranialis, arteria circumflexa femoris and the arteria femoris resemble in their course relations and pattern of branching in the two orders.

7. The course, relations and distribution of the arteria ischiadica in the birds of the order galliformes and the order anseriformes is similar with the exception of the following variations:

In the abdominal cavity, the arteria ischiadica in the order anseriformes gives rise to the arteria obturatoria in addition to other vessels given off by the artery in the order galliformes. The structures supplied by the arteria obturatoria in the order anseriformes are supplied by the arteria trochanterica and in part by the arteria glutea caudalis in the order galliformes.

In the pelvic limb the differential features between the two orders are confined to the branches of the arteria poplitea. In the area of the stifle joint the ramus muscularis and the ramus cutaneus were recognized in the order galliformes, but such well defined vessels could not be traced in the order anseriformes. In the order anseriformes, the arteria poplitea gives rise to the arteria femoris caudalis, the arteria tibialis posterior, arteria genus supreme and the arteria tibialis medialis in the popliteal region, and at the level of the proximal interosseous space formed by the tibia and the fibula, the
main vessel bifurcates into the arteria tibialis lateralis and the arteria tibialis anterior. In the order galliformes, the arteria poplitea gives rise to the ramus cutaneus, arteria femoris caudalis, ramus muscularis, arteria tibialis medialis and the arteria peronealis in the popliteal region; the vessel continues distally and gives rise to the arteria tibialis lateralis at the level of the distal interosseous space formed between the tibia and the fibula; the main stem of the vessel then crosses over to the dorsal surface of the tibia as the arteria tibialis anterior.

In the order anseriformes, the branches of the arteria dorsalis pedis are well developed and the web is highly supplied by the blood vessels. The arteria digitii prima, arteria digitii lateralis secunda, arteria digitii medialis secunda and the arteria digitii medialis tertia arise from the arteria metatarsaeae dorsalis medialis, and the arteria metatarsaeae dorsalis lateralis gives rise to the arteria digitii lateralis tertia, the arteria digitii medialis quarta and the arteria digitii lateralis quarta; whereas, in the order galliformes, the arteria digitii prima, arteria digitii secunda, arteria digitii tertia and the arteria digitii quarta arise directly from the arteria dorsalis pedis.

There are many arteriovenous shunts in the web of the birds in the order anseriformes which were evident in the arteriographs of the pelvic limbs injected with radio-opaque emulsion, but in the order galliformes no such arteriovenous shunts could be found in the arteriographs of the foot.

The species differences and the order differences in the class aves may be understood by following the developmental history of the
arteries. In the embryo, the capillaryplexuses precede the formation of the definite arterial and venous trunks in any region. It is through selection, enlargement and differentiation of appropriate paths in such networks that the definite vessels arise; those capillaries from which flow has been diverted atrophy (1). The selection of the appropriate channel from the diffuse capillary bed results both from the action of the inherited patterns and from the hemodynamic factors incident to the blood flow (2). The vascular channels lead to and from the centers of the metabolic activity in the organism (32). There may be some variations in the locations of these centers which may cause differences in the course, origin, pattern of branching and relations of the vessels in different species of birds.
SUMMARY

The comparative and topographic anatomy of the arteries of the domestic turkey (Meleagris gallopavo), chicken (Gallus domesticus), domestic goose (Anser anser), and domestic duck (Anas platyrhynchos) was studied by gross dissection and arteriography. Omitting the finer details of species and order differences, the arteries of the aforementioned birds may be summarized as follows:

The arteria carotis cerebralis, a branch of the arteria carotis interna supplies the brain.

The arteria carotis externa supplies branches to the extracranial structures.

The neck is supplied by the branches of the arteria carotis communis.

The truncus brachiocephalicus, after the origin of the arteria carotis communis, continues laterally as the arteria subclavia which in turn gives rise to the arteria axillaris. The main stem of the arteria subclavia continues as the arteria thoracica communis. The arteria axillaris is the main source of arterial supply to the pectoral limb, and the arteria thoracica communis supplies arterial blood to the pectoral muscles.

There are two sources of origin of the arteriae intercostales. The arteriae intercostales cranialis arise from the arteria vertebralis.
caudalis, and the arteriae intercostales caudalis originates from the descending aorta in the region of the fifth, sixth, and seventh thoracic vertebrae.

The arteria celiaca, the arteria mesenterica cranialis, and the arteria mesenterica caudalis supply branches to the organs of digestion in the abdominal cavity.

The truncus gonadorenalis supplies branches to the kidney, adrenal gland, genital organs and ureter. The male genital organs are supplied by the arteria testicularis which may arise from the truncus gonadorenalis, or, from the descending aorta, or, there may be two testicular arteries, one arising from the descending aorta, the other from the truncus gonadorenalis; the arteria uretodeferentiales craniales, a branch of the arteria renalis cranialis; the arteria uretodeferentiales intermedius, a branch of the arteria ischiadica; and the arteriae uretodeferentiales caudalis, branches of the pudendal arteries. The female genital organs are supplied by the arteria ovarica which may arise from the truncus gonadorenalis, or, directly from the descending aorta. There may be two to three ovarian arteries, one arising from the truncus gonadorenalis, and the others arising directly from the descending aorta; the arteria oviducta cranialis, a branch of the arteria iliaca externa; the arteria oviducta intermedius, a branch of the arteria ischiadica; and the arteria oviducta caudalis, a branch of the arteria pudenda externa.

The kidney is supplied by the arteria renalis cranialis, a branch of the truncus gonadorenalis; the arteria renalis intermedius and the arteria renalis caudalis, both branches of the arteria ischiadica.
The pelvic limb receives its arterial supply from the arteria iliaca externa and the arteria ischiadica, the latter contributes the major portion of the arterial blood supply.

The problem of avian anatomical terminology was solved by taking into consideration the terms previously used by different authors in the study of the bird's arteries. The nomenclature of the arteries of the head and neck, thoracic limb and the pelvic limb employed in this text follow closely the work of Grzimek (18), and the terms used to designate the branches of the descending aorta follow the work of Sápy (35) and Nashida (28). The nomenclature of the avian myology was taken from the work of Chamberlain (8). Many modifications, substitutions, additions and omissions are introduced to make the terms more descriptive and, chiefly, in order to conform to the Nomina Anatomica (30).


