

---

A SYSTEMATIC STUDY OF THE MAIN ARTERIES IN THE  
REGION OF THE HEART—AVES XVI

CHARADRIIFORMES. PART 1<sup>1</sup>

FRED H. GLENNY<sup>2</sup>

As in previous studies on the main arteries in the neck and thorax of birds, the writer herein presents the basic arrangement-pattern of these vessels in six species of Charadriiformes.

The patterns of arteries—derivatives of the embryonic aortic arches and other embryonic vessels of the head and neck region—appear to be significant as evidence in relative degrees of relationships among birds. It may be pointed out that orders, families, and genera with wide differences in the arrangement-patterns may be presumed to be widely divergent in their evolution, whereas those orders or families with uniform or highly similar arrangement-patterns appear to represent groups in which evolution may be regarded as centralized, terminal, or parallel in nature.

MATERIALS

Single specimens of the following species were dissected and diagrams of the arteries in the neck and thorax prepared:

Charadriidae:

*Oxyechus v. vociferus*.

Scolopacidae:

*Actitis macularia*.....#225065 USNM

*Macrorhamphus griseus*.

*Philohela minor*.

*Pisobia minutilla*.....#223691 USNM

Laridae:

*Larus argentatus*.

---

<sup>1</sup>Contributions of the Department of Zoology, University of Toronto, Canada.

<sup>2</sup>Formerly Assistant, Department of Zoology, University of Toronto; now at Blue Sea Lake Biological Laboratory, Messines, Quebec.

Materials for this study were collected by the Division of Birds, United States National Museum, Division of Ornithology, Cleveland Museum of Natural History, Division of Ornithology, Royal Ontario Museum of Zoology, and the writer.

OBSERVATIONS

The basic ordinal arterial arrangement-pattern is characteristic for the species studied.

The innominate artery (2) divides to form the common carotid (8) and subclavian (9) arteries. The latter then gives rise to the coracoid major (10), axillary (11), intercostal (12), and two pectoral (13) arteries in order, while the common carotid gives rise to the thyroid artery (16) and ductus shawi (14) before giving rise to the cervico-vertebral (17) and internal carotid (trunk) (21) arteries. The syringo-tracheal artery (15) arises from the ductus shawi; a short basi-oesophageal

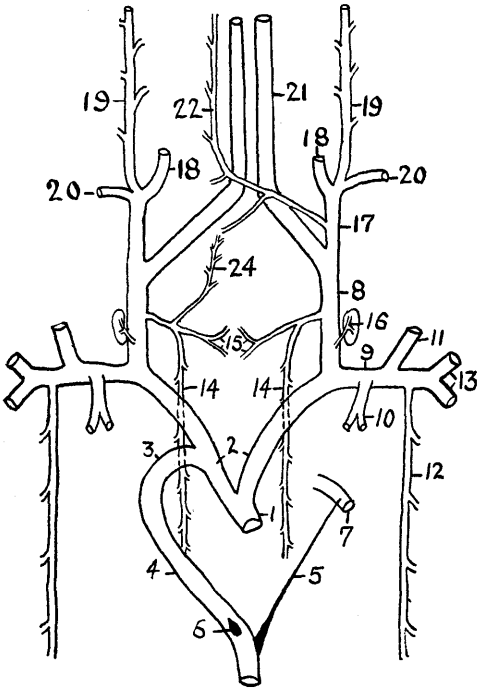


FIG. 1

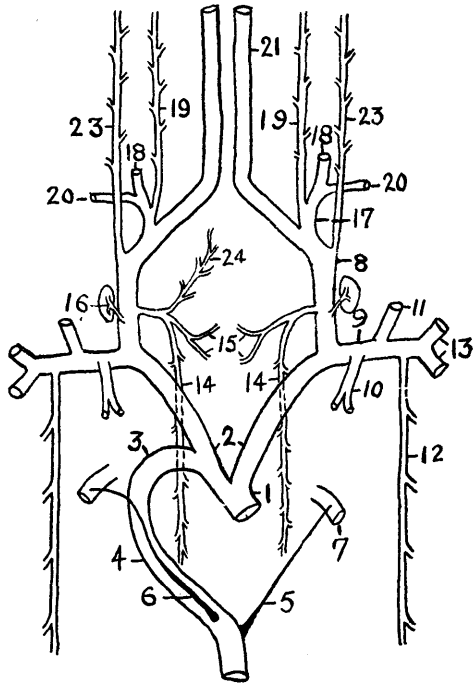


FIG. 2

FIG. 1. Diagram of main arteries of neck and thorax of *Oxyechus v. vociferus*. Ventral view.  
 FIG. 2. Diagram of main arteries of neck and thorax of *Larus argentatus*. Ventral view.

KEY TO ABBREVIATIONS

- |                                      |  |
|--------------------------------------|--|
| 1. aortic root.                      | 13. pectoral arteries.                     |
| 2. innominate arteries.              | 14. ductus shawi.                          |
| 3. right systemic (4th aortic) arch. | 15. syringo-tracheal arteries.             |
| 4. right radix aortae.               | 16. thyroid artery.                        |
| 5. ligamentum aortae.                | 17. cervico-vertebral artery.              |
| 6. ligamentum botalli.               | 18. vertebral artery.                      |
| 7. pulmonary artery.                 | 19. superficial cervical artery.           |
| 8. common carotid artery.            | 20. scapular artery.                       |
| 9. subclavian artery.                | 21. internal carotid (trunk) artery.       |
| 10. coracoid major artery.           | 22. accessory oesophageal artery.          |
| 11. axillary artery.                 | 23. accessory superficial cervical artery. |
| 12. intercostal artery.              | 24. basi-oesophageal artery.               |

artery (24) arises from the right ductus shawi. The scapular artery (20) arises variously from the cervico-vertebral artery. The ligamentum aortae (5) is present, while the right ligamentum botalli (6) may be present or atrophied in various degrees.

The Charadriiformes are "aves bicarotidinae normales" and both internal carotid (trunk) arteries enter the hypapophysial canal before passing anteriorly to the head.

The right superficial cervical artery (19) normally serves as the ascending-oesophageal artery.

In *Oxyechus vociferus* (Figure 1) the superficial cervical (19), vertebral (18), and scapular (20) arteries arise from the cervico-vertebral artery (17). An accessory oesophageal artery (22) arises from the left cervico-vertebral artery and passes diagonally across the ventral surface of the neck until it comes to the left side of the oesophagus and then passes anteriorly along its surface. The ligamentum botalli (6) remains as a small "button" at the site of its distal attachment to the right radix aortae (4).

In addition to the basic ordinal pattern, *Larus argentatus* (Figure 2) presents an accessory superficial cervical artery (23) on both left and right sides of the neck. This artery arises from the common carotid just posterior to the origin of the cervico-vertebral artery, and lies more ventral than does the normal superficial cervical (19). In addition to the ligamentum aortae (5), the right ligamentum botalli (6) is present and prominent and maintains both proximal and distal attachments.

*Macrorhamphus griseus* and *Actitis macularia* are very similar to *Oxyechus v. vociferus* except that (a) there is no noticeable accessory-oesophageal artery (22), (b) the vertebral artery (18) arises nearer the base of the cervico-vertebral artery (17) and (c) the ligamentum botalli (6) is entirely present.

*Philohela minor* is like *Macrorhamphus griseus* except that the ligamentum botalli appears to be fused with the right radix aortae or completely atrophied.

In *Pisobia minutilla*, the arrangement is the same as that of *Macrorhamphus* except that an accessory superficial cervical, more ventral than the normal superficial cervical, arises from the cervico-vertebral artery on the right side. Both the normal and accessory right superficial cervicals send blood to the oesophagus. The ligamentum botalli is present and complete.

#### DISCUSSION

From the above observations, it may be seen that although there is a basic ordinal arrangement-pattern of arteries in the neck and thorax of the Charadriiformes, there are also family, as well as individual or specific, variations. This would seem to indicate that the order is fairly well established with respect to evolutionary trends. The various families, however, do not appear to represent terminal forms. This is illustrated in the different families which present patterns somewhat divergent in nature.

The various species, and even families, of this order of birds show relatively less divergence, however, than do many of the species and even families of other orders of birds—Coraciiformes, Anseriformes, and Galliformes (Glenny 1943, 1944, and unpublished papers).

#### REFERENCES

- Glenny, F. H. 1943. A systematic study of the main arteries in the region of the heart—AVES VII. Coraciiformes, Part 1. Trans. Roy. Soc. Can., 3rd Ser., Sec. V, 37: 35-53.  
 1944. A systematic study of the main arteries in the region of the heart—AVES VIII. Anseriformes, Part I. Can. Jour. Res., D, 22:00-00. (In press).  
 Glenny, F. H. (Unpublished paper). A systematic study of the main arteries in the region of the heart—AVES XII. Galliformes, Part 1.