

Gastropods, on the under surface of the water, with its shell downwards.

Inhabits the Bolton and Gorton Canals at Manchester.

Suspecting that this American species had been introduced into our canals through the cotton-mills, I wrote to Mr. Rogers for information; and he tells me that in one habitat (and probably in the other also) the waste from the first process or "blowing-machine" is discharged close to that part of the canal where the *Planorbis* occurs. As the best cotton is cultivated in river-bottoms, and the crop, when picked, is spread out and dried, nothing is more likely than that it should take up either the *Planorbis* or its eggs; and these could be transported alive to any distance. The vitality of *Planorbis*, and its capability of enduring considerable changes of temperature, may be inferred from the habit which certain species are known to possess of closing the mouth of the shell in summer (when the shallow pieces of water in which they live are dried up) with an epiphragm or membranous lid, to exclude the heat and prevent the evaporation of the natural moisture. Thus protected, they keep alive for weeks, and even months, until the return of the rainy season.

In connexion with the foregoing, I would suggest that *Sphærium ovale* may have been introduced in the same or some other way from the United States. That species also inhabits the canals near Manchester, and may be the *Cyclas transversa* of Say. It has long been known in this country. I have a specimen which was in Dr. Turton's collection of British shells more than forty years ago.

I have written to Mr. Anthony, of Cambridge, Mass., one of the leading conchologists in the United States, for information as to the range of distribution there of both these species, and especially as to whether they, or either of them, inhabit the cotton-growing districts.

Several species of land-shells (e. g. *Zonites cellarius* and *Helix nemoralis*, var. *hortensis*), and perhaps of freshwater shells also, are supposed to have been introduced into North America from Europe by the agency of man, and are now thoroughly acclimatized in the former continent.

XLI.—*Notes on Seals (Phocidæ) and the Changes in the Form of their Lower Jaw during Growth.* By Dr. J. E. GRAY, F.R.S. &c.

ONE of the most important studies of zoologists has been the examination and comparison of the differences in the colour

and structure of fur or feathers, and other external characters, that occur during the growth of animals, and the differences that take place in the outer appearance of the same animals in the different seasons. Now that so much attention is paid to the characters afforded by the skull, teeth, and other parts of the skeleton to distinguish the recent species, and to separate them from the allied animals whose remains are found in a fossil state, it becomes most important that great attention should be paid to the variation which takes place in the form of the different bones during the progress of the animals towards maturity or old age, and the variation that occurs in the different bones of the skeleton of the same species, or in the skeletons of allied species.

Having the importance of this study always before my eyes, I send you an account of a difference which I have recently observed in the form of the lower jaws of Seals during the growth of the animals.

The British Museum has lately received the skulls and skeletons of some large European Seals (I believe, from the Baltic) which were exhibited in the Zoological Gardens as the "Ringed Seal, *Phoca annellata*." They are very interesting as showing the difference in the form of the front part of the lower edge of the lower jaw which occurs during the growth of these animals.

Unfortunately almost all the skulls of the European Seals previously in the Museum collection are from young animals. The examination and comparison of these skulls of young animals, and the comparison of these with the skulls of the adult Seals received from Mr. Wood from Vancouver's Island, which I described under the name of *Halicyon Richardii*, induced me to believe that the form of the lower edge of the "lower jaw afforded very good characters for the distinction of the species." (See Proc. Zool. Soc. 1864, p. 30, and Cat. of Seals and Whales in the Brit. Mus. 1865, p. 30.)

The skulls of older specimens of *Callocephalus vitulinus* in the British Museum show that, though the strength and general form of the lower jaw, and especially the position of the angle in the lower edge as compared with the condyle, do afford good specific and even generic characters, the form of the inner side of the lower edge, on which I have been inclined to place reliance, varies considerably according to the age of the specimens. In the young specimen, for example, the inner edge of the front of the lower jaw is dilated and produced inwards, so as to form a protection to the front of the gullet; but as the animal increases in age, this dilatation

appears to diminish, or, rather, not to be extended as the jaw becomes thicker in front, which it does in the adult animal.

In the skull of the adult animal, it no longer forms a projection on the inner side of the lower edge of the jaw; the jaw being much thicker and more substantial, it forms only a slightly marked keel on the middle of the lower surface of the jaw, separated from the rest of the jaw by a slight groove on its inner side.

The extent of this dilatation in the young animal affords a character for the separation of the young animals of the different species. Thus, in the young *Callocephalus vitulinus*, the dilatation only extends to a line even with the third lower grinder; in *Pagomys foetidus* it extends to a line even with the fifth or last lower grinder, and it is wider and more developed in the latter than the former. The ramus of the lower jaw in this genus is so oblique and directed backwards, that the angle on the hinder part of the lower edge is in a line considerably in front of the upper part of the compressed process in front of the condyle. (See Proc. Zool. Soc. 1864, p. 29, f. 3; Cat. Seals & Whales Brit. Mus. 1865, p. 28, f. c.)

Though it is impossible to determine the species of Seals with any certainty without the more careful examination and comparison of the skulls, yet it is by no means impossible that two or more specimens which are very distinct in external characters, manner, habit, voice, &c. may have very similar skulls, or skulls so alike that, when they are compared in a museum, they may be regarded only as individual or accidental variations of the same species.

The form of the hinder edge of the palate seems to be less liable to variation in the Earless Seals (*Phocidæ*) than in the Eared Seals or Sea-bears, at least as far as I have been able to observe in the skulls of these Seals in the British-Museum and other collections.

The earless Seals (*Phocidæ*) are distinguished from the other Pinnipedia thus:—A small perforation for the ear, without an external conch. Eyes large. The feet hairy, more or less clawed; fingers short, curved, webbed, clawed, forming a well-formed webbed foot; the toes unequal, the three middle shorter, forming a broad triangular foot when expanded and an elongated paddle when contracted; the palm and soles hairy. The hind limbs are folded together, and are produced outwards behind the body, when on land or in the water. Walking on land by the action of the abdominal muscles. Testicles enclosed in the body. Skull and skeleton very distinct from those of Otariadæ in external form; skull without any, or only a rudimentary postorbital process.

Section I. *Cutting-teeth* $\frac{6}{4}$, lower conical; hind toes clawed.

Tribe 1. PHOCINA. The front grinder in each jaw single-, not, as the rest, two-rooted. Head narrow in front. Muffle bald, callous, and with a central erect groove between the nostrils.

- I. Muzzle broad, whiskers smooth; third finger longest. Skull: face large, forehead convex, palate arched behind. Lower jaw strong, ramiserial angle under the front of the condyle; teeth small, compressed, far apart.

Phoca, Gray, Cat. S. & W. 31, f. 10.

- II. Muzzle conical, whiskers waved; first finger longest. Skull tapering in front; forehead flat; face small.

* Lower jaw strong, ramiserial angle in a line rather in front of the condyle; teeth thick, conical, lobed.

Pagophilus, Gray, *ibid.* 25, f. 8. Hinder end of palate truncated.

Halicyon, Gray, *ibid.* 27, f. 9. Hinder end of palate arched.

Callocephalus, Gray, *ibid.* 21, f. 7. Hinder end of palate angular.

** Lower jaw weak, ramus sloping, angle in front of the process in front of the condyle; teeth small, separate, compressed and lobed, especially in the lower jaw.

Pagomys, Gray, *ibid.* 22. Hinder end of palate angular.

Tribe 2. HALICHÆRINA. The grinders all single-rooted, except the two hinder of the upper and the hindmost of the lower jaw. Head broad, square in front; muzzle large, truncate; muffle hairy to the edge and between the nostrils; whiskers waved.

Halichærus, Gray, *ibid.* 33, f. 11. North Sea.

Section II. *Cutting-teeth* $\frac{4}{4}$. Muffle hairy to the edge and between the nostrils.

Tribe 3. MONACHINA. Lower cutting-teeth notched on the inner side; the first grinder in each jaw single-rooted, the rest two-rooted.

Monachus, Gray, *ibid.* 18, f. 6.

Tribe 4. LOBODONTINA. Cutting-teeth concave; grinders deeply and immensely lobed; the first, second, and third upper and the first lower grinder one-rooted, the rest two-rooted. Hinder claw small. Muffle hairy.

Lobodon, Gray, *ibid.* 9, f. 2 (skull). Lower jaw with angle beneath the condyles. Antarctic Sea.

Tribe 5. STENORHYNCHINA. Cutting-teeth conical; grinders more or less three-lobed, two front in each jaw single-rooted, the rest two-rooted. Muffle hairy to the edge and between the nostrils. Hind feet clawless. Antarctic Seas and South Pacific?

Stenorhynchus, Gray, *ibid.* 15, f. 5. Lower jaw strong, ramus erect; grinders with three cylindrical elongate lobes.

Ommatophoca, Gray, *ibid.* 33, f. 4. Lower jaw slender in front; grinders small, compressed, with a central incurved lobe and a very small one on each side.

Leptonyx, Gray, *ibid.* 11, f. 3. Lower jaw weak, ramus shelving backwards; grinders subcompressed, with small central and smaller posterior lobes.

Tribe 6. CYSTOPHORINA, Gray, *ibid.* 38. Lower cutting-teeth conical, unequal; grinders with small plaited crowns and large swollen simple roots. Muffle hairy, of male produced or inflated; whiskers waved.

Morunga, Gray, *ibid.* 38, f. 13. Nose of male produced into a trunk. Antarctic and North Pacific Oceans.

Cystophora, Gray, *ibid.* 40, f. 14. Nose of male with an inflated crest. North and, perhaps, South Atlantic.

XLII.—*On some points in the History and Relations of the Wasp (Vespa vulgaris) and Rhipiphorus paradoxus.* By ANDREW MURRAY, F.L.S.

EVERY entomologist knows that *Rhipiphorus paradoxus* undergoes its transformations in the nest of *Vespa vulgaris* (the common wasp which makes its nest underground). But in what capacity it is present there, and what are its relations to its hosts, are still matters of dispute. Is it as a robber and a murderer that it appears, or simply as a guest? and if as a guest, is it as a cuckoo-guest usurping the place of the genuine offspring of its hosts, or as an inoffensive changeling innocently imposed on the unconscious parents, and merely filling up a place which (from the wasp point of view) might have been better supplied had it been left empty?

In support of the more truculent hypothesis, Mr. Stone records, in the 'Entomologist's Monthly Magazine' (i. p. 118), how he found a larva of *Rhipiphorus* "sticking to the larva of



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