

three were found infected with this gregarine. But a few specimens were found in each host. Boulder, Colorado.

Gigaductus parvus Crawley from *Harpalus pennsylvanicus* Dej. Found in several specimens from Vincennes, Indiana.

Echinomera hispida (Schneider) from *Lithobius coloradensis* (Cockerell). A few specimens of this queer gregarine were found in each of several Chilopods examined. These could not be separated by careful measurements from Schneider's species. In some specimens the ratio of the length of the protomerite to the length of the deutomerite was as low as one to seven, while Schneider's original figures give this as one to eleven or more. Other specimens seemed intermediate between *E. hispida* (Schneider) and *Echinomera horrida* (Leger). It seems probable then that *E. horrida* (Leger) is synonymous with *E. hispida*, leaving a single species in this genus. The occurrence of *E. hispida*, in Boulder is not surprising since *Lithobius forficatus* the host from which Schneider described *E. hispida*, has been introduced here. The Chilopods from which this gregarine was taken were collected near the University Campus, Boulder, Colorado.

9. A Table for Use in the Identification of Birds' Skulls.

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In 1867 Huxley (2) in a masterly paper pointed out the taxonomic value of the different arrangements of certain bones in the avian palate. It is not intended to enter into a discussion as to whether the skulls thus grouped together under one name form a "natural group" that is satisfactory from the point of view of classification. The literature relating to this discussion may be obtained by reference to the works of Newton (3) and Beddard (1).

Apart from their taxonomic significance then, the names employed by Huxley, with slight modifications, are of considerable descriptive value and the table given below has been found very useful not only in laboratory class work but also as a key in the ready separation into groups of miscellaneous collections of birds' skulls.

The living birds were divided by Huxley into two orders the Rati-
tiae or Struthious Birds and the Carinatae i. e. all the remaining
living birds. The Carinatae were then divided into four separate
groups called the Dromoeognathous, the Schizognathous, the
Desmognathous and the Aegithognathous birds according to the
arrangement of the bones of the palate.

The first group, the Dromoeognathous birds, contained only the single genus *Tinamus* "which has a completely struthious palate". In using the term in a descriptive sense as is done in the table below, the dromoeognathous birds therefore comprise not only the tinamous but also the struthious birds.

The second group, the Schizognathous birds, were divided into six sub-groups but the term applies equally well to them all and, as used here, includes the whole six sub-groups.

The third group, the Desmognathous birds, were divided into seven sub-groups and the term is employed below to include these seven sub-groups.

At the end of this group an exceptional sub-group the Celeomorphae, of doubtful position, was discussed and it was concluded that, although possessing some points in common with the last sub-group of the desmognathous birds, on the whole the Celeomorphae were best regarded "as an aberrant group of the Aegithognathae" (Huxley, loc. cit. p. 468). Parker in 1872 (4) pointed out the importance of this isolated sub-group and proposed to raise them to the rank of a group equal to the others under the name of the "Saurognathae" "a name which shall be a memorial of their Lacertilian facial morphology" (Parker 5, p. 2). In the table given below the term saurognathous is applied to the type of skull met with in this group.

The fourth group, the Aegithognathous birds, were divided into two further sub-groups and this term as used below comprises only these two sub-groups and not the Celeomorphae.

It only remains now to define the terms as used in the table. The definitions have been adapted from the works of Huxley (2) and Parker (4 and 5) and also Newton (3) and Beddard (1).

The Dromoeognathous type. The vomer is very broad. At its anterior end it meets the maxillo-palatine plate of the maxilla while at its posterior end it is met by the posterior extremities of the palatines and the anterior ends of the pterygoids¹. Thus the palatines and pterygoids do not articulate with the basisphenoidal rostrum as in the remaining groups.

The Schizognathous type. The vomer, which may be large or small, tapers to a point at its anterior end while its posterior end embraces the basisphenoidal rostrum between the palatines. The palatines and pterygoids articulate directly with one another and with the basi-

¹ This is not the case in *Struthio* where the vomer is short and is not met by the palatines and pterygoids. These latter however do not articulate with the basisphenoidal rostrum so that the skull is truly dromoeognathous.

sphenoidal rostrum and are not borne by the divergent posterior end of the vomer.

The maxillo-palatines, which are usually elongated, unite with the anterior processes of the palatines and pass backwards leaving a fissure between themselves and the vomer.

The Desmognathous type. The vomer may be abortive or so small as to disappear, or if present is slender and tapers to a point anteriorly. The maxillo-palatines unite across the middle line either directly or by means of ossifications in the nasal septum. The posterior ends of the palatines and the anterior extremities of the pterygoids articulate with one another and with the basisphenoidal rostrum.

The Aegithognathous type. In this group the vomer is broad, abruptly truncated in front and its deeply cleft posterior extremity embraces the basisphenoidal rostrum. The palatines have their postero-lateral angles produced. The maxillo-palatines, slender at their origins, extend obliquely inwards and backwards over the palatines and finish beneath the vomer in expanded extremities that are not united either with one another or with the vomer. Ossification may take place in the part of the nasal septum in front of the vomer and the space between it and the premaxilla may become filled with spongy bone, but there is no fusion between this and the vomer.

Dromoeo- gnathous	Palatines and Pterygoids do not articulate with basisphenoidal rostrum		Palatines and Pterygoids do articulate with basisphenoidal rostrum	
	Vomer broad		Vomer more or less narrow	
	Desmo- gnathous	Vomer small or absent	Vomer more or less well developed	
		Maxillo-palatines touch in middle line	Maxillo-palatine processes do not touch in middle line	
Dromoeo- gnathous	Desmo- gnathous	Sauro- gnathous	Vomer paired	Vomer single
			Vomer pointed	Vomer truncated
			Schizo- gnathous	Aegitho- gnathous

The Saurognathous type. The vomers are a pair of delicate rod-like bones. The maxillo-palatines are sometimes rudimentary and when developed are slight and short, not extending beyond the outer edges of the palatines. The palatines and pterygoids articulate with one another and with the basisphenoidal rostrum..

List of References.

- 1) Beddard, F. E., "The Structure and Classification of Birds". London 1898.
- 2) Huxley, J. H., "On the Classification of Birds; and on the Taxonomic Value of the Modifications of certain of the Cranial Bones observable in that Class". Proc. Zool. Soc. London 1867.
- 3) Newton, A., "A Dictionary of Birds". London 1893.
- 4) Parker, W. K., "On the Structure and Development of the Crow's Skull". Trans. Roy. Mic. Soc. vol. VIII. 1872.
- 5) —, "On the Morphology of the Skull in the Woodpeckers (Picidae) and Wry-necks (Jungidae)". Trans. Linn. Soc. Zool. 2nd Series I. 1875.

10. Über einige Haleciiden.

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(Mit 7 Figuren.)

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Das Material, welches ich untersuchte, rührt von der östlichen Küste des adriatischen Meeres her. Aus der Adria sind bisher von den Haleciiden nur folgende Arten bekannt: *Halecium halecinum* (L.) (= *Halecium beanii* Johnston n. Broch)¹, *Halecium labrosum* Alder, *Halecium tenellum* Hincks, *Halecium pusillum* (M. Sars) und *Halecium robustum* Pieper. Von Schneider (12) wurden noch zwei Halecien für die Adria angeführt: *Halecium minimum* n. sp. und *Halecium nanum* Alder, die nicht aufrecht erhalten werden können. Die erste Art hat neuerdings Broch (1911) in *Halecium robustum* einbezogen. Was die zweite Schneidersche Art anbelangt, so wird sie zuerst von Bonnevie (6) von dem ursprünglichen Alderschen *Halec. nanum* getrennt und mit dem neuen Namen »*Halec. schneideri*« belegt. Indessen fällt nach Jäderholm (1909) und Broch (1911) die letzte Art mit dem *Halecium tenellum* zusammen. Ich aber habe die bei Rovigno gefundene und von Schneider als *H. nanum* Alder bezeichnete Art mit *Halec. (ophiodes) pusillum* identisch angenommen (1910). Jetzt, da mir nachträglich Alders Publikation zu Händen gekommen ist, bin ich noch immer derselben Ansicht. Übrigens läßt sich aus den Schneiderschen allzu kurzen Diagnosen nicht recht entnehmen, welche Kolonien er eigentlich vor sich gehabt hatte.

¹ Mir liegen nur wenige sterile Kolonien von dieser Art vor. Broch [(7) S. 13] verspricht uns indessen »den eingehenden Beweis« für die Identität dieser Art mit *Halec. halecinum* »in einer späteren Arbeit« vorzulegen.

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