

through its hibernating mycelium in the potato tubers, just as the potato itself has largely lost its power to reproduce sexually through the formation of seeds. This loss of sexual power is shown in different degrees by the different strains of the fungus in artificial cultures. The fungus seems to lose first its power of producing antheridia and then of producing oogonia. Under favorable conditions attempts to form oogonia first appear, and under still more favorable conditions the antheridia are produced, and with the formation of these the oospores also appear in more or less perfect form.

A further discussion of this subject, with photomicrographs of the sexual stages as we have gradually developed them, will appear in the next report of the Connecticut Agricultural Experiment Station.

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NEW HAVEN, CONN.,
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A POSSIBLE LINE OF DESCENT OF THE GOBIOID FISHES

Indicating the doubt existing as to the relationship of the gobies are the several different positions assigned to them in the schemes of classification suggested from time to time by different authors. Without attempting anything like an exhaustive survey of the disposition of the group by different authorities its treatment by a few of them may form an introduction to the suggestions of relationship in the following lines.

Dr. Gill, in his "Arrangement of the Families of Fishes,"¹ places the superfamilies Gobioidae and Cottoidea in adjoining groups. But in his later arrangement² he has several families interposed between the Gobiidae and Cottidae, as the Batrachidae, the Uranoscopidae, the Trachinidae, the Malacanthidae and others.

Dr. Jordan, in his "Guide to the Study of Fishes,"³ has placed the gobies near the cottoid fishes with the following remark: "The great family of Gobiidae, having no near rela-

tions among the spiny-rayed fishes, may be here treated as forming a distinct suborder."

Dr. Boulenger, in the Cambridge Natural History,⁴ places the Gobiidae between the Kurtidae and Echeneidae, and expresses the opinion that the gobies "are not very remote from the Perciformes, and may have evolved out of a type not very different from the Percidae."

Mr. Regan, in his classification of the teleostean fishes,⁵ has placed the suborder Gobioidae between the Blennioidea and the Kurtoidei.

Recently while examining the skeleton of *Dormitator maculatus*, a large goby from the warm waters of the American Pacific and Atlantic, I was impressed with the similarity of its shoulder girdle with that of the family Cottidae and certain other cottoid or mail-cheeked fishes. In light of the fact that there is otherwise very little in the anatomy of the gobies that might show their line of descent, I wondered that the line from some ancestor of the Cottidae had not been long ago suggested, more especially as there seems to be little reason why such relationship should not exist.

The similarity of the shoulder girdles of these families has long been known. As early as 1865 Dr. Gagenbaur published a picture of the shoulder girdles of a gobioid and a cottoid fish side by side in the second part of his "Untersuchungen zur Vergleichenden Anatomie der Wirbelthiere."⁶

The condition of the shoulder girdle in the Cottidae and Gobiidae is as follows: The coracoid elements and the actinosts are arranged in a continuous row on the posterior edge of the clavicle; the hypercoracoid above, next the actinosts, and ending below with the hypocoracoid—the actinosts attached directly with the clavicle, and separating the coracoid elements widely from each other. In the typical condition—the condition in the great majority of fishes—the coracoid elements are broadly attached to each other, and the actinosts are attached to their posterior edges remote from the clavicle.

¹ Macmillan and Co., 1904.

² *Ann. Mag. Nat. Hist.*, Ser. 8, Vol. III., 1909.

³ *Hemitripterus acadianus* and *Gobius guttatus*, Taf. VII., figs. 8 and 9.

⁴ "Smith. Miss. Col.," 1872.

⁵ *Mem. Nat. Acad. Sci.*, Vol. VI., pp. 127-138.

⁶ Henry Holt and Co., 1905.

The fact that all of the mail-cheeked fishes do not have the coracoid elements separated by the actinosts is not an argument in disfavor of the relationship of the Gobiidæ to the Cottidæ, because the mail-cheeked fishes with the typical shoulder girdle (such as the Scorpenidæ) were, of course, the ancestors of the Cottidæ. From the Cottidæ came the Liparidæ and the Cyclopteryidæ, as Dr. Gill long ago pointed out.¹

It does not seem improbable that the gobies may have come from some ancestor—probably scale-covered—of the Cottidæ in which the shoulder girdle had become differentiated. Further, it is not altogether improbable that this ancestor might also have been from somewhere along the line leading towards the Cyclopteryidæ and the Liparidæ; some form in which the ventrals had just become attached to each other, much as in most of the gobies of to-day. From this the sucking disk of the Liparidæ and Cyclopteryidæ could have developed. In considering this supposition, of course, we could only explain the gobies with separate ventrals by the separation being secondary. The gobies further resemble the last two families in having no myodome to the cranium.

It is conceded, certainly, that the family Gobiidæ is not very close to the Cottidæ, they having lost the suborbital stay to the preoperculum and undergone other changes, and no modification of the suborders containing these two families is suggested. The character of the shoulder girdle seems to be the most significant character in showing a possible line of descent of the gobies, and it is suggested in light of it that the group be placed in close relationship with the mail-cheeked fishes in works involving classification. With this question in mind the gobies should, of course, be studied in detail.

EDWIN CHAPIN STARKS

CARCHARIAS BORNEENSIS AND BARBUS ELONGATUS,
AS PREOCCUPIED NAMES

IN the *Philippine Journal of Science*, Vol. V, No. 4, Section D, October, 1910, p. 263,

¹ *Proc. U. S. Nat. Mus.*, Vol. XIII., 1890.

Pl. 1, Mr. Alvin Seale describes, as new, "*Charcharias borneensis*." This is preoccupied by *Carcharias (Prionodon) borneensis* Bleeker, *Act. Soc. Sci. Ind.-Neerl.* (Borneo 12), V, 1858-59, p. 8.

In the same journal Mr. Seale also describes, as new, *Barbus elongatus*, on p. 265, illustrated on Pl. 2 as Fig. 1. This is preoccupied by *Barbus elongatus* Rüppell, *Mus. Senckenb.*, II, 1837, p. 11, Pl. 2, Fig. 1.

HENRY W. FOWLER

ACADEMY OF NATURAL SCIENCES,
PHILADELPHIA, PA.,
February 9, 1911

SOCIETIES AND ACADEMIES

THE PHILOSOPHICAL SOCIETY OF WASHINGTON

THE 693d meeting was held on April 8, 1911, President Day in the chair. Three papers were read.

Mechanical Forces on an Electrical Conductor:
Dr. FRANK WENNER, of the Bureau of Standards.

Starting with the equation for the electromotive forces in an inductive circuit the speaker showed how it follows under certain conditions that a current through a conductor causes forces such as to require a tension in the conductor to maintain equilibrium, that is, the forces tend to increase the length of the conductor. It also follows that under other conditions the forces are such as to tend to decrease the length of the conductor. Under most conditions the force on an element of the conductor near the surface is such as to tend to crowd it toward the center.

It was also stated that it is possible that a current in a conductor causes forces other than those due to electro-magnetic and electrostatic actions, the former only having been considered by the speaker. So far, however, no one has shown the presence of any such additional force.

The Completion of the Texas-California Arc of Primary Triangulation: Mr. WM. BOWIE, of the Coast and Geodetic Survey.

Three grades of triangulation are recognized: primary, secondary and tertiary; and the grade depends upon the accuracy of the angle and length measurements rather than upon the length of line between pairs of stations.

The primary work is extended in long arcs over