

shell is larger, the apex more blunt, the greater obliquity of the volutions, and in their greatest convexity being at or below the centre. Position and locality, Rockford shales, Owens Grove (south exposure), Cerro Gordo county, Iowa.

Loxonema owenensis, n. sp.—Shell very large and robust, subconiform; spire rather rapidly ascending, apex blunt. Volutions eight to ten or more, very oblique, strongly inflated, most prominently so below the centre, rounded. Suture deeply channeled; shell from two mm. to six mm. in thickness; aperture subovate. Surface apparently smooth. The depth of the suture in this species is very much greater than the suture in either the foregoing or following species. Height of adult specimens from fourteen to sixteen and one-half centimetres; diameter of body volution from four to five centimetres. This is, we believe, the largest species of the genus yet described. Position and locality, Rockford shales, Owens Grove (south exposure), Iowa.

Loxonema crassum, n. sp.—Shell large, subconiform depressed, rapidly broadening from the blunt apex. Volutions from five to seven, slightly flattened or broadly rounded; suture strongly channeled below; shell very thick; surface apparently smooth; aperture ovate. This species differs from *L. gigantea* in its more robust, depressed form, and the less convexity and obliquity of its volutions. Position and locality, Rockford Shales, Owens Grove (south exposure), Iowa. Quite a large number of specimens of each of the species described have been secured, and their specific differences are shown to be constant and well marked.—*Clement L. Webster, Charles City, Iowa.*

SOME EXTINCT SCLERODERMS.—In 1887, in the *Memorie della Societa Italiana delle Scienze* of Naples (3d series, v. 6, No. 4),¹ Baron Achille de Zigno has published descriptions and illustrations of two very interesting Scleroderms from the Eocene beds of Italy. One of these is the *Protobalistum imperiale* of Massalongo, the other a previously unknown species considered to be congeneric with the former and named *Protobalistum Omboni*; both were obtained from the celebrated Mount Bolca beds. The most casual examination will convince one who has had much experience with recent fishes that the two species have little in common and belong to very different genera if not families. Both are, however, important for the light they may throw on the genetic relations and former distribution of the Scleroderms, but each owes its importance to a different reason.

The generic description of *Protobalistum* given by Baron de Zigno is based on the assumption that there are certain characters

¹ Duc nuovi pesci fossile della famiglia dei Balistini scopertinel terreno eoceno del Veronese. (8 pp., 2 pl.)

which are common to the two forms, which does not appear to be justified by the specimens; on the development of 4 to 6 dorsal spines, of spinous rays to each pectoral ("pectorales radiis duobus spinosis"), and of 1 to 3 spines to each ventral ("ventrales radiis 1—3 spinosis, retro-flexis"). Such features as the last two are so incompatible with the structure of living Scleroderms that the suspicion is unavoidable that their ascription to the extinct forms is due to some error of observation or interpretation. The principal feature described and corroborated by the illustrations is the number of dorsal spines. The arrangement of the spines is nevertheless very different in the two species.

The typical *Protobalistum* (*P. imperiale*) has six (or seven) dorsal spines, rather widely separate from each other, extending from over the eye far back upon the posterior half of the body, and very elongate (the foremost especially); the soft dorsal as well as anal are very short. No pectorals and ventrals are represented in the figure, although it is asserted that there is a ventral spine.¹ The character of the dorsal fin is very different from that exemplified in any of the Balistids or Triacanthids. None of the Balistids have more than three dorsal spines, and all having that number have the second close behind the first, and modified to lock it in erection, in such a manner as to have obtained for the species the name Trigger-fish. The *Protobalistum* should therefore be apparently considered as the type of a peculiar family with generalized characters and allied to the progenitors of the Siganids and Teuthidids; the family name in such case would of course be *Protobalistidæ*.

The so-called new *Protobalistum* (*P. Omboni*) has four dorsal spines moderately approximated and confined to the forward part of the back; the first spine is very strong and the others very short; the soft dorsal is elongated, and the anal is oblong; the caudal peduncle is long. In fact, the species has the physiognomy as well as the structural characteristics (so far as known) of the Triacanthids, and there appears to be no reason for doubt that it belongs to that family, and that it is related to the genera *Triacanthodes* and *Hollardia*, with which it agrees in the convex caudal fin, and perhaps the development of one or two axillar rays, besides the elongated ventral spines. ("Le ventrali sono costituite da tre soli raggi spinosi rivolti all' indietro e addentellati nei loro margini, di cui il primo e lungo 27 millimetri, il secondo 25 e il terzo 20, e cadauno alla base ha il diametro di 2 millimetri.") The caudal fin is very large, and has a convex posterior margin, thus differing from that developed in the Triacanthinæ. No generic

¹ Delle pettorali non si scorge sull' esemplare alcuna traccia e delle ventrale si vede soltanto un solo raggio spinoso lungo tre centimetri ripiegato all' indietro lungo il ventre (p. 4).

name being available for the fossil, it may be named *Protacanthodes Omboni*, the name recalling that the foremost elements of the spinous dorsal as well as ventrals are enlarged spines, as well as that it is a forerunner of the Triacanthids. It differs from *Hollardia* and *Triacanthodes* in the oblong caudal peduncle and enlarged caudal fin while its physiognomy rather recalls the true *Triacanthi*. The occurrence of a form so closely related to the *Triacanthodes* of the Japanese sea, and to the *Hollardia* of the Caribbean in the eocene seas of Europe, is worthy of special note, and this is a sufficient reason for the present communication.

The nearest extinct associate of *Protacanthodes* is not *Protobalistum* but *Acanthopleurus* Ag. The two belong to the same family but appear to be otherwise distantly related. The other extinct genera of Scleroderms, *Balistomorphus* Gill, *Acanthoderma* Ag. 1843, not Cantraine, 1835, and *Bucklandium* Koenig—*Glyptocephalus* Ag.) are rather to be associated with the Balistids.

The exact characters and relations of all these fishes remain to be known.—*Theo. Gill.*

THE PHYLOGENY OF THE HORSES.¹—This brochure of 71 pages, illustrated by two excellent plates, cannot fail to instruct the student who is unfamiliar with this subject. The authoress shows a great degree of familiarity with the history of the facts known in this connection and they are set forth with considerable fulness of detail. She has been more fortunate than some of her predecessors in avoiding record *in extenso* of the mythology of the subject, which has been long since consigned to its place in the waste-basket by American palæontologists. We allude to the Eohippus, Miohippus, and Pliohippus, which still appear occasionally in theological works and school-books of America and England. A considerable part of the essay is devoted to the endeavor to prove that the genera *Palæotherium* and *Hippotherium* must be excluded from the line of descent, which has continued from *Protogonia puercensis* through *Phenacodus*, *Hyracotherium*, etc., to *Equus*. She describes and figures with much care certain bones of the carpus and tarsus of *Anchitherium*, *Hippotherium*, and *Equus*, in evidence of this position as regards *Hippotherium*. We say with reference to this question, that in discussing the phylogeny of *genera*, one must confine himself to *generic characters*, and it is necessary to ascertain what these are in the skeleton before we can use them properly. There are some species of supposed *Hippotherium* of North America which approach *Equus* so closely in dental characters that the descent of some species of the latter from them looks probable. Probably the species of *Equus* are polyphyletic,² some coming from

¹ *Etudes sur l'Histoire Palæontologique des Ongulés, II, le Développement des Equidæ.* Par Marie Pavlow. Moscow, 1888.

² I have expressed this opinion in an article on the *Perissodactyla* in *American Naturalist*, 1887, p. 1075.