45. REMARKS on SAUROCEPHALUS, and on the SPECIES which have been referred to that GENUS. By E. T. NEWTON, Esq., F.G.S., H.M. Geological Survey. (Read June 20, 1878.)

IN the year 1824 Dr. Harlan described a portion of a fossil jaw which had been obtained in 1804, during an expedition up the Missouri, from what were believed to be Secondary rocks (Journ. Acad. Nat. Sci. Philad. 1830, vol. iii. p. 331). Dr. Harlan thought this specimen showed reptilian affinities, and compared it with certain species of *Ichthyosaurus*; but, believing it to be generically distinct, he named it *Saurocephalus lanciformis*. Prof. Owen subsequently showed ('Odontography,' p. 130, pl. 55) that this specimen was to be referred to the group of Fishes.

There has been so much misunderstanding about the genus *Saurocephalus*, to which certain specimens in this country have been erroneously referred, that it has been thought desirable to bring together all the known facts, in order, if possible, to correct the synonymy of the species.

Dr. Harlan (*l. c.* p. 335), after giving the measurements of the bone above mentioned (now known to be a maxilla), says:—"There are eighteen teeth in different states of preservation; the longest are seven tenths of an inch, two tenths only projecting above the bone, the projecting part enamelled, smooth, and shining, lanciform; the edges are very sharp. . . . The bodies of the teeth are all hollow, and are firmly fixed in a longitudinal groove, there being no distinct separate alveolæ. The bodies of the teeth are in close contact throughout. . . . The body of the bone is not perforated by a canal for the inferior maxillary nerve, in place of which is observed a groove running the whole length of the dental bone, immediately beneath the alveolar portion, on the mesial aspect of the bone; the bottom of this groove is perforated with foramina for the distribution of the nerves and blood-vessels, equal in number to the teeth (*i. e.* 18)."

As regards the teeth being in grooves, Dr. Harlan seems to have been mistaken. Dr. Hays in 1830 (Trans. Am. Phil. Soc. vol. iii. p. 471), when describing his *Saurodon Leanus*, examined the original specimen of *Saurocephalus*, and found that the teeth were really lodged in distinct alveoli; he gives a figure of a portion of the jaw from which the outer lamina has been removed, so as to show the alveoli and the form of the teeth. The close affinity of *Saurocephalus* and *Saurodon* was recognized by Dr. Hays, and he proposed to place them both in his genus *Saurodon*, which he thus characterized:—"Teeth of lower jaw closing within those of the upper like incisors; a regular series of foramina along the inner aspect of the jaws near their alveolar margins, for the passage of nerves and blood-vessels to the teeth."

Prof. Agassiz in the year 1843 (Poiss. Foss. tom. v. p. 101) referred

certain large flattened teeth from the White Chalk of Sussex, which had been figured by Dr. Mantell in his 'Geology of Sussex' (pl. xxxiii. figs. 7 & 9), to Harlan's *Saurocephalus lanciformis*, but does not state why he so refers them. A comparison of Agassiz's figures (pl. xxv^c. f. 21-29) with those given by Harlan (*l. c.* pl. xii.) will, I think, be sufficient to throw doubt upon their belonging to the same species. Prof. Agassiz doubtless had good reasons for referring these teeth to Harlan's genus and species, but does not mention them in the text. If Agassiz's figures be compared with figure 7 of Harlan's plate, the close resemblance between them will be at once seen; and when first referring to this plate I was struck with the similarity, and thought that the well-known teeth from the English Chalk had been correctly referred to Harlan's species; but upon turning to the explanation of the plate I found that this identical tooth (fig. 7) was circular in section, and, moreover, that it belonged to an *Ichthyosaurus* which was described in another paper, but the figures had been mixed on this plate. Is it possible that, in some way, this unfortunate intermingling of the figures was the cause of a mistake?

Dixon, in his 'Fossils of Sussex' (1850), figured a lower jaw (pl. xxxi. f. 12) bearing large flattened teeth, resembling those figured by Agassiz. This jaw he also refers to *Saurocephalus lanciformis*. In a note on page 375 he says that "Sir P. Egerton has obtained a specimen of *Saurocephalus lanciformis* showing that the premaxillary bones were prolonged into a rostrum, as in the Xiphoids (tab. xxxii*. fig. 1)".

In the year 1856 Dr. Leidy carefully redescribed the original specimen of *Saurocephalus lanciformis* (Trans. Am. Phil. Soc. 1860, vol. xi. p. 91, pl. vi.), and pointed out, among other interesting characters of the specimen, that the teeth "have the same mode of insertion and order of succession as in the existing *Sphyræna*," and that their crowns have the "trenchant borders finely denticulate." Dr. Leidy considers that the isolated teeth figured by Agassiz (*l. c.* pl. xxv^c. f. 21-29), and the jaws and teeth figured by Dixon (*l. c.* pl. xxx. f. 21, pl. xxxi. f. 12, pl. xxxiv. f. 11), have been erroneously referred to *Saurocephalus lanciformis*, and therefore establishes a new genus and species for their reception, which he names *Protosphyræna ferox*. The rostrum figured by Dixon (pl. xxxii*. f. 1) he did not think belonged to the same fish, and consequently gave it another name, *Xiphias Dixoni*.

The specimens lately obtained in America by Prof. Cope show that Sir Philip Egerton was correct, and that this rostrum and lower jaw do belong to the same kind of fish.

A corrected list of the fishes which have been attributed to *Saurocephalus* is given at the end of Dr. Leidy's paper. This list, with some modifications, is included in the one given below (p. 794).

More recently specimens of jaws with teeth, resembling those represented by Dixon, have been discovered in the Cretaceous rocks of North America, and described by Cope (Geol. Surv. Terr. 1875, vol. ii. Cret. Vert. pp. 217, 275), who has established a new genus

for their reception, *Erisichthe*, believing that the differences between them and *Saurocephalus* were of even more than generic importance. The similarity between the portion of lower jaw figured by Cope (*l. c.* pl. xlviii. f. 6) and that given by Dixon (pl. xxxi. f. 12) is such that no one would have much doubt of their generic relationship. Some specimens, obtained during 1877 from the Niobrara Cretaceous of Kansas, have enabled Prof. Cope to make still further additions to our knowledge of these peculiar fishes (Bulletin 6, Geol. Surv. Terr. 1877, p. 821); and he describes three new species, which he distinguishes by the form of the rostrum, and then concludes by saying, "A fourth species has been found in England, and figured by Dixon in the 'Geology of Sussex.' The portions represented in this work [Dixon] are the mandibles, which resemble those of the *E. nitida*, and which were supposed at that time to belong to a species of *Saurocephalus*. A muzzle, perhaps of the same species, was regarded as a Sword-fish, which was called *Xiphias Dixoni* by Agassiz. It should be now termed *Erisichthe Dixoni*." Prof. Cope does not appear to have known that Dr. Leidy had already named the English specimen *Protosphyraena ferox*, by whom also the name of *Xiphias Dixoni* was proposed for the rostrum figured by Dixon. Agassiz was not the author of this name.

A due consideration of the facts of the case show conclusively, as it seems to me, 1st, that the specimens figured by Messrs. Agassiz and Dixon, and referred by them to the *Saurocephalus lanceiformis* of Harlan, do not belong to that genus and species, and this species will have to be expunged from our lists of British fossils; 2nd, that these specimens do agree generically with those described and figured by Prof. Cope.

Dr. Leidy in 1856 proposed, as already mentioned, the generic name of *Protosphyraena* for these British specimens; and this name therefore must be adopted, and not that of *Erisichthe*, which was given by Prof. Cope in 1872 to the American specimens.

The most important characters of the genus *Protosphyraena*, as we now know them, are the elongation of the ethmoidal region into a rostrum resembling that of the sword-fish, and the peculiar form of the mandible (*vide* Dixon, Foss. Suss.). Both the upper and lower jaws have large compressed teeth, lodged in distinct alveoli, besides other smaller teeth. The following description of the *Protosphyraena* (*Erisichthe*) *nitida*, Cope, recently obtained from the Niobrara Cretaceous of Kansas, will give the best idea of the structure of the head of these fishes (Cope, Bull. Geol. Surv. Terr. 1877, vol. iii. n. 4, p. 821):—"From this and other specimens I discover that the anterior portion of the skull, probably the ethmoid bone, is produced into a long beak, in general form similar to the sword-like snout of the Sword-fishes of modern seas. . . . A remarkable feature of the genus is displayed in the mandibles. Each of these is compound in the region usually composed of the simple dentary bone. It there consists of three parallel elements, an internal and an external embracing a median element. The inner bears a band of teeth *en brosse* on its inner and superior aspect, and the external a few teeth

of similar character on its superior edge. The large lancet-shaped teeth are borne by the middle element, excepting some of the largest near the symphysis. Two of these on the inner side of the ramus originate in the internal bone. The maxillary bone forms the greater part of the arcade of the mouth, and has no superior articulation with the facial part of the skull. It is attached by a simple sutural articulation with the premaxillary, so as to permit of some lateral motion. The premaxillary also has no superior condyle articulating with the cranium, but the entire length of its superior margin is applied in a groove of the ethmoid bone, so as to be immovable. Anterior to the premaxillary bones, on the inferior aspect of the ? ethmoid, is situated a pair of large, compressed, double-edged teeth, whose alveoli are close together."

The different forms of the rostra have been taken by Cope as specific characters. In *P. nitida* "this weapon is distinguished by the flat superior surface of its distal half. The section in this region is semicircular." *P. penetrans* "has a snout of uniformly oval section at all points." In *P. ziphioides* "the form of the muzzle is quite peculiar. Its shaft is depressed, with a strongly convex inferior surface and a slightly convex superior surface, the two separated by an obtuse angular border," &c.

The rostrum figured by Dixon is nearly circular in section throughout, and therefore differs from all the above American species. This difference was observed by Cope, who proposed that this specimen and the mandible represented in the same work should be known as *Erisichthe Dixoni*; this name, however, must give place to the older one of *Protosphyrcæna ferox*, given by Leidy to the mandible in 1856.

Although numerous specimens of teeth, parts of jaws, and rostra have been obtained from British Cretaceous strata, yet all the fragments of rostra with which I am acquainted resemble that figured by Dixon in being nearly circular in section; the other portions found are not sufficient to afford grounds for specific distinction. At present, therefore, we are only able to record one species of this genus as occurring in Britain, viz. *Protosphyrcæna ferox*.

Sir Philip Egerton has kindly called my attention to the following foreign species which have been referred to the genus *Saurocephalus*, viz. *S. albensis*, Pictet & Campiche; *S. dispar*, Hébert; *S. inæqualis*, Münster; *S. inflexus*, Pictet & Campiche; and *S. substratus*, Münster. These species have all been founded on isolated teeth, and it seems to me that there must be considerable doubt as to their generic and specific affinities.

Saurodon Leanus was first described by Dr. Hays in 1829 (Trans. Am. Phil. Soc. 1830, vol. iii. p. 471). The specimen was obtained from the Greensand near Moorestown, New Jersey. It includes the upper and lower jaws of both sides. The author recognized the close relation existing between this specimen and the *Saurocephalus lanciformis* of Harlan, and in his description mentions, among other points of structure, the following:—"The dentary has a single row of alveoli, and just below the border there is a row of

foramina, one to each alveolus. The teeth of the lower jaw close within those of the upper. Intermaxillary very distinct, and united by squamous suture with the maxilla. The alveoli show that the teeth projected. The maxilla has distinct alveoli for teeth, and just within the border on the inner surface there is a regular series of foramina similar to those of the dentary. The exterior of this bone, where not broken, presents a shagreened appearance. The teeth in both jaws are similar, and placed close together in a single row; those of the lower jaw, however, are rather more compressed than those of the upper, and the anterior teeth of the lower jaw are smaller than the posterior ones. The crowns are enamelled, smooth, lanciform, slightly incurved, and the hinder ones of the lower jaw slightly curved forwards. Their roots are hollow, and slightly grooved on their inner and outer faces. There appear to have been 9 or 10 teeth in the intermaxillary, and about 30 in the maxilla; the number in the dentary not known." Dr. Leidy says there were about 42 teeth in the dentary of this specimen.

Dr. Hays proposed to place this species in the same genus with *S. lanciformis*, with the generic name of *Saurodon*, and the distinctive characters of the genus have been given above (p. 786). The two species are thus distinguished:—

"1. *S. lanciformis*. A groove along the inner surface of the dental bone for the accommodation of the inferior maxillary nerve; teeth very obtusely lanciform."

"2. *S. Leanus*. Teeth acutely lanciform, much smaller than in preceding species, slightly curved."

Dr. Harlan in 1834 (Edin. New Phil. Journ. vol. xviii. p. 28) pointed out that Dr. Hays was altogether wrong in establishing a new genus (*Saurodon*) for those two species, when he (Dr. Harlan) had already in 1824 given the name of *Saurocephalus*. The latter name no doubt has the priority, and must therefore be adopted.

Prof. Agassiz, in his 'Poissons Fossiles' (vol. v. p. 102), refers certain peculiar teeth from the Chalk of Lewes to the *Saurodon Leanus* of Hays, but unfortunately does not give his reason for so referring them. In his description he says, "in place of being regularly conical, as in *Saurocephalus*, they are curved backward, and their points are cut obliquely with an inflated margin (*un rebord renflé*). The surface is finely striated from the base almost to the summit. At the base of the tooth is a pronounced annular enlargement, under which one can see the root, which is reticulated. . . . One of these teeth is represented enlarged in fig. 31. The root appears to be united with the bone of the jaw, but it is not sufficiently preserved in our specimen to allow its intimate structure to be made out."

Why this peculiarly *barbed* tooth should have been referred to the *Saurodon Leanus*, in which the crowns of the teeth are simply flattened and slightly incurved, I cannot clearly understand; for the forms of the two teeth seem to me widely different. Compare Poiss. Foss. t. v. pl. xxv^e. f. 30, 31, with Trans. Am. Phil. Soc. 1830, vol. iii. pl. xvi. f. 7-9.

In Dixon's 'Fossils of Sussex' a specimen is figured (pl. xxxii*.

fig. 10) which bears teeth similar to those just mentioned as figured by Agassiz, and, like them, is referred to *Saurodon Leanus*. This specimen is described in the text as follows:—"The specimen figured is of great interest; it shows the lower jaws united at the symphysis, and a portion of the right palatine bone in its natural position. . . . The barbed teeth described by M. Agassiz are those on the palatine bone, their edges are finely serrated; the teeth of the lower jaw are of an entirely different form, the base is broad and fluted, the blade compressed and recurved, with a sharp, finely serrated edge; they are separated by wide intervals, which are filled by innumerable small pointed teeth."

The differences between this specimen and the type of *Saurodon Leanus*, Hays, are so obvious that surely they only need to be pointed out in order to be generally acknowledged. Notwithstanding this, and although Dr. Leidy first called attention to these differences in the year 1856 (Trans. Am. Phil. Soc. 1860, xi. p. 94), up to the present time the name of *Saurodon Leanus* has been retained in our lists of British fossil fishes. Dr. Leidy, towards the end of his paper, says:—"To *Saurodon Leanus*, Hays, Agassiz has erroneously referred the fragment of a palate-bone with teeth (Poiss. Foss. v. p. 102, pl. xxv^c. figs. 30, 31) of another large Sphyrænoïd fish from the Chalk of Lewes, England. Though the true *Saurocephalus* may have had semibarbed teeth to the palate-bone, like those just referred to in the fragment described by Agassiz, yet this could not fairly be inferred from the condition of the living *Sphyræna*."

Dixon has noticed and represented (Geol. Sussex, p. 373, pl. xxx. figs. 28, 29, pl. xxxii*. fig. 10) several large, isolated, semibarbed teeth, and a lower jaw and palate-bone with teeth, which, following Agassiz, have been referred to *Saurodon Leanus*, Hays, "to which they certainly cannot belong." From the above quotation it will be seen that Leidy is firmly convinced of the generic distinctness of the true *Saurodon Leanus* and the specimens figured by Agassiz and Dixon and called by the same name.

In order to be as certain as possible about this matter, I have compared the original specimen figured by Agassiz and Dixon, and also another in the Museum of Practical Geology which has similarly barbed teeth, with the descriptions and figures given by Hays and Leidy, and I find that there are even greater differences than have hitherto been pointed out. Agassiz's type is merely a fragment of bone with two or three barbed teeth; both the other specimens have part of the lower and upper jaws; but in neither of them does there appear to be any trace of the maxilla or premaxilla. The lower jaw is shallow in proportion to its length, and has as great an extent horizontally as vertically; in *S. Leanus*, Hays, on the contrary, the lower jaw has a greater vertical than horizontal extent. In the British specimens the large teeth in the lower jaw have compressed crowns, curved backwards and striated; but these have *no roots lodged in sockets*, the expanded base resting upon, and being firmly ankylosed to, the jaw. The form of the mandible might have led one to

infer that there were no roots; but a fracture through the jaw in the region of one of the teeth places this beyond doubt, showing, as it does, that the teeth are hollow, without fangs, and merely ankylosed to the surface of the bone in a manner similar to that which obtains in the fixed teeth of the pike. The points of some of the teeth are seen to be furnished with minute caps of enamelled substance. In Mr. Willett's specimen, figured by Dixon (pl. xxxii*. fig. 10), the bone of the roof of the mouth bears the barbed teeth, and has been regarded as a palatine bone; but I think there is now evidence of its being the pterygoid, for its anterior part seems to have been attached to another bone; and furthermore, in a specimen in the Jermyn-Street Museum, there are two bones in this region—an anterior one, which I regard as the palatine, and a posterior one, corresponding with that preserved in Mr. Willett's specimen, which is probably the pterygoid. Both these bones carry barbed teeth, which are ankylosed in a similar manner to those of the lower jaw. In some of these barbed teeth it may be noticed that the sharp cutting-edge of the front convex border only extends from the apex about halfway down the tooth.

It is very unlikely that the *S. Leanus* of Hays ever possessed palatine teeth; but, however that may be, the mode of implantation of its teeth is totally different from what occurs in the British specimens in question; and the necessity of placing the latter in a separate genus, will, I think, be obvious to all who carefully consider the structural differences which they present. Dr. Leidy had already seen the necessity for this change in 1856, and gave the name of *Cimolichthys levisiensis* to these British specimens. The name of *Saurodon Leanus*, therefore, must now be erased from our lists of British fossils.

In the year 1845 M. Reuss (Böhm. Kreide, p. 8) named certain fragmentary barbed teeth *Spinax marginatum*. These specimens were referred with considerable doubt by M. Hébert (1854, Mém. Soc. Géol. France, ser. 2, vol. v. p. 350), together with others which he describes, to the genus *Anenchelum* of Blainville (1818, 'Sur les Ichthyolites,' pp. 9, 87), retaining for them the specific name of *marginatum*. It is probable that these teeth are generically identical with the English ones hitherto referred to the *S. Leanus* of Hays; but I do not think we should be at all justified now in placing them in the genus *Anenchelum*, concerning which so little is known. It may be that Reuss's specimens will eventually prove to be of the same species as the English ones; but it seems to me that it would not be right to adopt the name of *Cimolichthys marginatus* for the English specimens without stronger evidence than is afforded by these isolated teeth.

Saurocephalus striatus was founded by Agassiz (Poiss. Foss. vol. v. p. 102) upon a fragment of a jaw in Dr. Mantell's collection containing three teeth, resembling in form those of the so-called *S. lanciformis*, but much smaller and striated. No mention is made of any series of foramina along the inner aspect of the jaw, which is

one of the most marked characters given by Drs. Harlan and Hays for this genus. I have examined the type specimen, now in the British Museum, upon which Agassiz founded this species, and also others in the Museum of Practical Geology, and can find no trace of the characteristic foramina: the specimens, if true, are mere fragments, with one side in the matrix, and therefore one cannot speak with certainty; but a close examination reveals another most unexpected fact, which is, that the teeth are *not implanted in sockets*, as in both upper and lower jaws of *Saurocephalus*, but are merely ankylosed to the edge of the jaw, having no true fangs. This difference of structure is one of such importance that it cannot but be regarded as generically distinctive; and this species must therefore be removed from the genus *Saurocephalus*. Dr. Leidy, not knowing the mode in which the teeth were fixed to the jaw, referred this species to his genus *Protosphyrcæna*; but it will be obvious from what has been said above that it cannot be placed in that genus. The only specimens which can be referred to this species are such small fragments that it seems to me impossible to speak with any thing like certainty of their generic affinities; but their mode of dentition, it will be noticed, agrees with that observed in *Cimolichthys levisiensis*—that is, the teeth are ankylosed to the surface of the jaw and are not implanted in sockets; and I should propose, therefore, provisionally to call this species *Cimolichthys? striatus*, although it seems very probable that it will eventually prove to belong to a distinct genus.

There is considerable doubt in my mind as to whether the specimen figured by Dixon as *S. striatus* (pl. xxxv. fig. 5) really belongs to this species. The teeth certainly appear to be without fangs, and are ankylosed to the jaw in the same manner as they are in *C. striatus*; but the teeth are not so much flattened, neither are they set close together in a regular series, but are placed at intervals; moreover they are of very different sizes, some being very small. Judging from specimens in the British Museum, it seems likely that the specimen figured by Agassiz is a portion of a maxilla, and may well have belonged to a fish with a lower jaw such as that figured by Dixon (pl. xxxv. fig. 5). The form of this jaw, however, and the mode of its dentition are similar to what are found in *Cimolichthys levisiensis*, Leidy, although the forms of the teeth are different; and, it will be remembered, the form of the maxilla of the latter species is not known. I would suggest, therefore, that until we have better evidence of the form and structure of Agassiz's *C. striatus*, the jaw figured by Dixon be regarded as the same species, and that both, for the present, be placed in the genus *Cimolichthys*.

*List of Genera and Species which have been referred to
Saurocephalus, &c.*

SAUROCEPHALUS LANCIFORMIS, Harlan. (America.)

Saurocephalus lanciformis, Harlan, 1830, Journ. Ac. Nat. Sci. Philad. vol. iii. p. 331, pl. xii. f. 1-5.

Saurodon lanciformis, Hays, 1830, Trans. Am. Phil. Soc. vol. iii. p. 476, pl. xvi. fig. 11.

Saurocephalus lanciformis, Harlan, 1834, Trans. Geol. Soc. Penn. vol. i. p. 87; Harlan, 1835, Med. & Phys. Res. p. 362, figs. 1-5; Owen, 1843, 'Odontography,' p. 130, pl. iv.; Leidy, 1856, Trans. Am. Phil. Soc. 1860, vol. ii. p. 91, pl. vi. figs. 8-11; Cope, 1875, Geol. Surv. Terr. vol. ii. Cret. Vert. pp. 216, 275.

SAUROCEPHALUS LEANUS, Hays. (America.)

Saurodon Leanus, Hays, 1830, Trans. Am. Phil. Soc. vol. iii. p. 471, pl. xvi. f. 1-10.

Saurocephalus Leanus, Harlan, 1834, Trans. Geol. Soc. Penn. vol. i. p. 87; Edin. New Phil. Journ. vol. xviii. p. 28; Leidy, 1856, Trans. Am. Phil. Soc. 1860, vol. xi. p. 91, pl. vi. f. 12-15.

Saurodon Leanus, Cope, 1875, Geol. Surv. Terr. vol. ii. Cret. Vert. p. 275.

SAUROCEPHALUS ARAPAHOVIVUS, Cope. (America.)

Saurocephalus arapahovivus, Cope, 1872, Proceed. Am. Phil. Soc. vol. xii. p. 343; Cope, 1875, Geol. Surv. Terr. vol. ii. Cret. Vert. pp. 216, 275, pl. xlix. f. 5.

PROTOSPHYRÆNA FEROX, Leidy. (England.)

Unknown fish, Mantell, 1822, 'Geology of Sussex,' p. 227, pl. xxxiii. f. 7-9.

Saurocephalus lanciformis, Agassiz, 1843, Poiss. Foss. vol. v. p. 102, pl. xxv^c. f. 21-29; Dixon, 1850, Foss. Suss. p. 374, pl. xxx. f. 21, xxxi. f. 12, xxxii*. f. 1, xxxiv. f. 11.

Protosphyræna ferox, Leidy, 1856, Trans. Am. Phil. Soc. 1860, vol. xi. p. 91.

Xiphias Dixoni, Leidy, 1856, *ibid.* p. 91.

Erisichthe Dixoni, Cope, 1877, Bull. Geol. Surv. Terr. vol. iii. p. 821.

PROTOSPHYRÆNA ANGULATA, Cope. (America.)

Portheus angulatus, Cope, 1872, Proc. Am. Phil. Soc. vol. xii. p. 337.

Erisichthe angulatus, Cope, 1875, Geol. Surv. Terr. vol. ii. Cret. Vert. pp. 217, 275; 1877, Bull. Geol. Surv. Terr. vol. iii. p. 821.

PROTOSPHYRÆNA NITIDA, Cope. (America.)

Erisichthe nitida, Cope, 1872, Proc. Acad. Philad. p. 280; 1875,

Geol. Surv. Terr. vol. ii. Cret. Vert. pp. 217, 275, pl. xlviii. f. 3-8;
1877, Bull. Geol. Surv. Terr. vol. iii. p. 821.

PROTOSPHYRÆNA PENETRANS, Cope. (America.)

Erisichthe penetrans, Cope, 1877, Bull. Geol. Surv. Terr. vol. iii.
p. 821.

PROTOSPHYRÆNA ZIPHIOIDES, Cope. (America.)

Erisichthe ziphioides, Cope, 1877, Bull. Geol. Surv. Terr. vol. iii.
p. 821.

CIMOLICHTHYS LEVESIENSIS, Leidy. (England.)

Saurodon Leanus, Agassiz, 1843, Poiss. Foss. vol. v. p. 102, pl.
xxv^c. f. 30, 31; Dixon, 1850, Foss. Suss. p. 373, pl. xxx. f. 28, 29,
pl. xxxii*. f. 10.

Cimolichthys levesiensis, Leidy, 1856, Trans. Am. Phil. Soc. 1860,
vol. xi. p. 91.

CIMOLICHTHYS MARGINATUS?, Reuss. (France and Bohemia.)

Spinax marginatus, Reuss, 1845, Böhm. Kreide, p. 8, pl. iv.
figs. 10, 11.

Anenchelum marginatus, Hébert, 1854, Mém. Soc. Géol. Fr. ser. 2,
vol. v. p. 350.

CIMOLICHTHYS? STRIATUS, Agassiz. (England.)

Saurocephalus striatus, Agassiz, 1843, Poiss. Foss. vol. v. p. 102,
pl. xxv^c. f. 17-20.

? *Saurocephalus striatus*, Dixon, 1850, Foss. Suss. p. 375, pl.
xxxv. f. 5.

Protosphyrcæna striatus, Leidy, 1856, Trans. Am. Phil. Soc. 1860,
vol. xi. p. 91.

Note.—Since the above was written, a valuable paper by Mr. W. Davies, of the British Museum, “On the Nomenclature of *Saurocephalus lanciformis*, of the British Cretaceous Deposits; with Description of a New Species (*S. Woodwardi*),” has appeared in the ‘Geological Magazine’ (dec. 2, vol. v. p. 254); and it is most satisfactory to find that, in so far as we treat of the same subject, we are in perfect agreement, except as regards the name which should now be adopted for the so-called *Saurocephalus lanciformis*. Mr. Davies is of opinion that the name *Protosphyrcæna*, proposed by Prof. Leidy, should not be adopted, inasmuch as it seems to indicate an affinity with *Sphyrcæna*, which does not exist, and he therefore would use Prof. Cope’s name of *Erisichthe*. Although quite appreciating the cogency of my friend’s reasoning, I could not but feel that this was a case in which the law of priority must be respected. Unwilling, however, to trust to my own judgment alone, I laid the matter, as clearly and fully as

I could, before Prof. Huxley and Mr. W. S. Dallas; and both these gentlemen unhesitatingly said the name of *Protosphyraena*, being the earliest, is the one which will undoubtedly have to stand. I have also had a conversation with Prof. Cope. He maintains that Prof. Leidy did not in 1857 sufficiently characterize his genus *Protosphyraena*, and therefore that his name must be ignored, and that of *Erisichthe* adopted. Prof. Leidy has given what he considers to be a sufficient reason for separating the English so-called *Saurocephalus* from the American ones; and by his reference to the figures and descriptions of Agassiz and Dixon, makes it perfectly clear to what he gives the name of *Protosphyraena*. This seems to me to be all that the laws of nomenclature demand. His species, *Protosphyraena ferox*, is also manifestly the type of the genus. I should not be justified, therefore, in altering the synonymy in the above list. The new species of true *Saurocephalus*, described in the latter part of Mr. Davies's paper, will have to be added to the list, thus:—

SAUROCEPHALUS WOODWARDI, Davies. (Maestricht.)

Saurocephalus Woodwardi, Davies, Geol. Mag. 1878, dec. 2, vol. v. p. 254, pl. viii. figs. 1 & 2.

Oct. 12, 1878.