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The following papers were read:—

ON BONES AND TEETH OF A LARGE EXTINCT LIZARD.

BY

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(PLATES I.-III.)

SIR RICHARD OWEN has lately (Phil. Trans., pt. 1, 1884) adduced evidence, derived from "pleistocene" deposits, of the former existence in Australia of a large pleurodont lizard. In a fragment of a jaw with roots of teeth, submitted to him by the Department of Mines, New South Wales, there were found reasons for concluding that it had belonged, not to a crocodile as at first surmised, but to a lizard allied to Hydrosaurus, but more than twice its size. To the reptile represented by this interesting relic the name Notiosaurus dentatus was assigned by the veteran anatomist, and, in our conceptions of the later bygone scenes of Australian land-life, it pairs off remarkably well with the huge Megalania made known to us by the same author. Under a misapprehension of the stratigraphical horizon of Notiosaurus, arising from the fact that it was merely stated to be "pleistocene," the writer was induced to believe that the lacertilian remains to which his subsequent observations refer were of an age anterior to that of the New South Wales specimen and to propose for them a distinctive name. On reference, however, to Sir R. Owen's original memoir it appears that the jaw described by him was drawn from deposits abounding in Diprotodont and other remains which the writer has been accustomed to regard as, in Queensland, newer pliocene, not strictly pleistocene. Thus corrected, he has no other sufficient reason to doubt that the teeth, and consequently the other bones to be referred to the same lizard, are those of Notiosaurus dentatus, Owen., and under that name, proceeds to describe them. The first, in order of discovery, which at one time appeared to him to belong to an undescribed genus, is a bone of the fore limb—a left humerus in perfect preservation as far as the interval between the radial tuberosity and the head, which is unfortunately lost. Before examining the proofs yielded by this fossil that Notiosaurus was congeneric with the existing Varans of Australia, Monitor, Hydrosaurus and Odatria, and yet was not generically identical with either of them, it may be well to facilitate comparison by tabulating the measurements of this fossil with those of a species of each recent genus:—

	Notiosaurus dentatus. c.m.	Monitor gouldi. c.m.	Hydrosaurus giganteus. c.m.	Odatria punctata. c.m.
Entire length ...	*20 (estimated)	5·0	7·0	1·7
Length to summit of radial tuberosity	17·0	4·0	5·8	1·55
Breadth of distal end...	10·7	2·0	2·5	0·6
Breadth of articulating surfaces	7·2	1·1	1·7	0.325
Least breadth of shaft, palmar aspect	3·2	0·65	0·8	0·125
Thickness of distal end	5·0	0·6	0·95	0·2

* Eight inches.

The length of the specimen of M. gouldi, of which the humerus was measured, was 34 inches; that of H. giganteus 58 inches, and that of O. punctata 17 inches. From the figures tabulated it appears that in the extinct lizard the arm was considerably shorter, in proportion to its breadth, than in the living species. The vastly greater area of the articulating surfaces of the elbow-joint is especially remarkable; not only is it much longer from back to front, by reason of the greater thickness of the bone in this region, but it occupies a larger proportion of the whole breadth. This points to a more robust fore-arm and paw and through them to some variation or restriction of habit. We are further led to observe that the least departure from the proportions of the fossil humerus is made by that of M. gouldi among the living species compared with it.

On the palmar or hinder aspect of the bone, the eye notes at once the unusually deep depression of the olecranal fossa (Pl. 1, o.f.), its depth being apparently exaggerated by the turgescence of the rotulo-condylar region (Pl. 1, r.c.)—the large medullary foramen (Pl. 1, m.f.) is situated on its outer edge, not at its apex as in living genera. The supinator ridge (Pl. 1, s.r.) is strongly developed and, proximad, terminates in an oval tuberosity, 1·75 c.m. in length, for the attachment of the supinating muscle, which must have been of large volume and, therefore, much used in the motions of the fore-limb. Immediately below the tuberosity the ridge is, as usual in this group, perforated by a tunnel for the passage of the great ulnar artery and nerve. In recent forms the perforation is much nearer the end of the ectepicondyle (Pl. 1, e.c.t.) This latter region is almost engrossed by an irregular depression for the origin of the extensor carpi radialis and differs but little in shape from that of Hydrosaurus. On the entepicondylar surface (Pl. 1, ent.) the insertion of the coracobrachialis is into an elongated prominence placed more proximad than the rounder prominence in Monitor and contrasting with the depression for the same muscular insertion in Hydrosaurus. The radial condyle (Pl.. 1, r.c.) is narrower and lower, relative to the ulnar, than in either of the existing genera; the ulnar (Pl. 1, u.c.) condyle broader, less convex than in Hydrosaurus and much less so than in Monitor and Odatria; its inner limit is conspicuously defined by a raised lip continued from the dorsal aspect to the olecranal pit, and forming a groove between its inner side and the entepicondyle—this lip is not developed in the living genera. The proximal edge of the articulating surfaces of the joint on this aspect is nearly parallel with their distal edge—in Hydrosaurus and Odatria it slopes rapidly from the radial condyle inward; in Monitor there is more approximation to its direction in the fossil.

On the dorsal side the surface of the distal expansion is strongly convex—above the middle of the mesial line of the shaft is the broad shallow pit for the powerful tendon of the latissimus dorsi (Pl. 2, l.d.) and on the inner side of it and below it a low ridge passes down, curving outwards in its course to reach the mesial line. The anterior (outer) edge of the shaft ascends with a strong concave sweep to the deltoid insertion (Pl. 2, del.), which stands out prominently: and the contour of this side of the bone clearly indicates an expansion of the proximal in just proportion to that of the distal end.

On separating from the foregoing statement of the superficial characters of the fossil those from which its nearest affinities may be deduced it is not easy to derive a definite opinion from them alone—the relations of Notiosaurus seem to librate equally between Hydrosaurus and Monitor; but when we take into account the comparative dilatation of the bone in Monitor this of surviving genera appears to have diverged the least from its predecessor.

Left scapula.—(Plate III.)

In the Australian genera of the Monitor group of lizards, the scapulas vary less among themselves than do the arm-bones. There is, therefore, an antecedent probability that the shoulder-blade of any extinct member of the family would present fewer salient points of differentiation than the humerus. This consideration leads the writer to believe that a portion of a scapula which he had long ascribed to Hydrosaurus might well belong to the same pleurodont as the arm-bone which has been under notice; but, had this comparative sameness not been observed, it must be confessed that the differences from the Hydrosaurus or Odatria scapula exhibited by the present subject might have continued to be supposed within the limits of individual variation, notwithstanding immense superiority in size. The fossil consists of the articular portion of the scapula proper and that of the coracoid. The scapula neck is broad, and on its outer surface rather concave, resembling in the former respect that of Hydrosaurus; in the latter, neither of the living forms. The hinder wall of the glenoid cavity (Pl. III., gl.) has a downward extension which furnishes a proportionately larger surface of articulation with the head of the humerus. The small foramen at the base of the epicoracoid fenestra (Pl. III., e.f.) is round : in all other respects it has a close resemblance to the scapula of Hydrosaurus. The long diameter of the glenoid cavity is 4·5 c.m., its short diameter 3·8 c.m., the corresponding measurements in Hydrosaurus being 1·2 c.m. and 1·0 c.m. From the middle of the anterior lip of the glenoid cavity to the margin of the round foramen the distance in the fossil is 4·0, in the recent bone 1·1 c.m.

Assuming the length of the humerus to be a measure of the length of the entire animal the ratio between the two in Monitor would, if applied to the fossil, give a length of not quite 12ft. for the extinct reptile—compared with Hydrosaurus that l ngth would be increased to 14ft. 6in, while in comparison with Odatria it would attain 15ft. 6in. If, however, we take the breadth of the bone at the distral end as the basis of comparison, we attain in the same series of comparisons 18ft. 2in., 20ft. 9½in., and 25ft. 4in. Taking the mean of the results of the comparison with Monitor, with which its affinities seem to be strongest, we arrive at a probable length of 15ft. for the owner of this humerus accompanied, however, by a massiveness of body and limb not preserved in its modern representatives.

From the scapula alone, which from wide difference of locality could not have belonged to the same individual as the humerus, we should be compelled to estimate the entire length of

Notiosaurus as nearly four times that of Hydrosaurus, or about 18ft. 4in.

It is not difficult to conceive the part taken in the affairs of its day by this great lizard as well, or better, fitted for carnage on land as a crocodile of equal size in the waters. The functions of its dwarfed successors are twofold. Part of their work is to check the undue increase of all living things unequal to themselves in strength, agility, and courage. With limbs muscular in proportion to the weight of their gross bodies, and in length sufficient to obtain the necessary extent of grasp, they climb trees with facility and, squatting in ambush on the boughs, seize the birds as they alight for rest, plunder their nests of young or eggs, or search every hole and covert for nocturnal animals in their lairs. Equally at home on the ground, they are, when hungry (and in summer they are seldom otherwise), constantly roaming about seeking and devouring without waiting to kill, unless killing is neeessary to swallowing. Nothing comes amiss to them, and snakes are among their choicest morsels. In a word, if it were not absurd to deorate any one animal as the most efficient balancer of the pros and cons of nature, an Australian might be inclined to give the palm to the bush-wife's horror, the "gohanner,"—and this more especially when he remembers that the reptile's disposition is not only to lop the exuberance of animal life but to clear away the dead and mortiferous encumbrances left in its midst. The 'guana and the eagle are the scavengers of the bush—the latter gorges the carcasses fallen afresh in the forest, the former resorts to the putrifying remains beside creeks and pools and battens on the garbage till it can scarce remove its unwieldly body out of danger. And such, we may believe, would be one of the chief labours of love committed to the great 'guana of old. Its size, the shortness of its limbs, and the difficulty of satisfying its appetite with the puny frequenters of the trees, would be sufficient to prevent it acquiring arboreal habits; but while size and voracity at once impelled and enabled it to swallow whole the bulkier creatures of its age, and thin their numbers to equilibrium point, its powerful fore-limbs would aid it chiefly in its attack on lifeless prey—with their support and help the jaws would rend the flesh and tear apart the tendons of the dead Diprotodon and Notothere as easily as those of its descendant the remains of the kangaroo and bullock.

We may add that if the former conditions of life were as favourable to the numeric increase of Notiosaurus, and probably other such giants, as those at present in force are locally to Hydrosaurus and Monitor, human life in its pristine feebleness could hardly have made head against them. That man in any form was coeval with these great lizards is yet to be discovered; but the fact of his universal friend, the dog, being then in the land is too suggestive to allow us to put the idea aside. Is it possible that the absence from these drifts of human remains is related to the frequency of those great carnivors? Is it possible, also, that the legends of dragons and hydras are but echoes that have reached European shores of the struggles of naked heroes with their saurian foes in far away lands?

TOOTH.—(PLATE III.)

Curiously enough the preceding notes were hardly penned when fortune favoured the writer with a tooth of the same age and probably of the same species as the one indicated by the humerus. It was in a medley of small bones and fragments forming part of the Museum Collectors' gatherings during the last three weeks at Clifton, Darling Downs. Its opportune appearance is the more interesting in that it seems to strengthen one of the opinions formed respecting Notiosaurus. The teeth in Monitor, compared with those in Hydrosaurus, are broad and thick; the tooth of the latter is distinctly serrated on both edges, while in the Monitor tooth the fore-edge only is serrated, and that faintly. The outline of the tooth of the extinct lizard resembles that of Hydrosaurus, but it is proportionately thicker; its fore-edge is smooth and also like the Monitor tooth, it has the basal fluting extended higher on the inner side towards the crown than in Hydrosaurus. On the other hand, its shape and the almost entire want of the ridge descending upon the outer side of the tooth sufficiently differentiate it from that of a Monitor proper. We have, therefore, here additional evidence that the extinct lizard had greater affinity with the smaller than with the larger of these two living genera.

The length of this tooth is 2·1 c.m., its breadth 1·2 c.m.; the measurements of a middle tooth of Hydrosaurus are 0·6 c.m. and 0·3 c.m.; of Monitor, 0·3 c.m. and 0·2 c.m.; and from these elements of comparison we may estimate the entire length of the animal to have been in the mean 18ft. 6in.

DESCRIPTION OF A SPECIES OF ELEOTRIS FROM ROCKHAMPTON,

BY

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A more frequent imitation of the example set by Mr. W. N. Jaggard, of Rockhampton, who is actively engaged in collecting the aquatic products of his neighbourhood, cannot be too highly recommended to all friends of knowledge: those, perhaps, more especially who are resident in the north. The observation, most prolific of discovery, is that of the local observer. Among several apparent novelities due to the zeal of Mr. Jaggard is one which I have no hesitation in bringing under your notice, as interesting in its kind. It is a member of the genus Eleotris; a genus, including a great number of species of small fishes: some among the commonest in our fresh water-pools and brooks: some found only in tidal waters. The numerous forms have for convenience sake been arranged in two

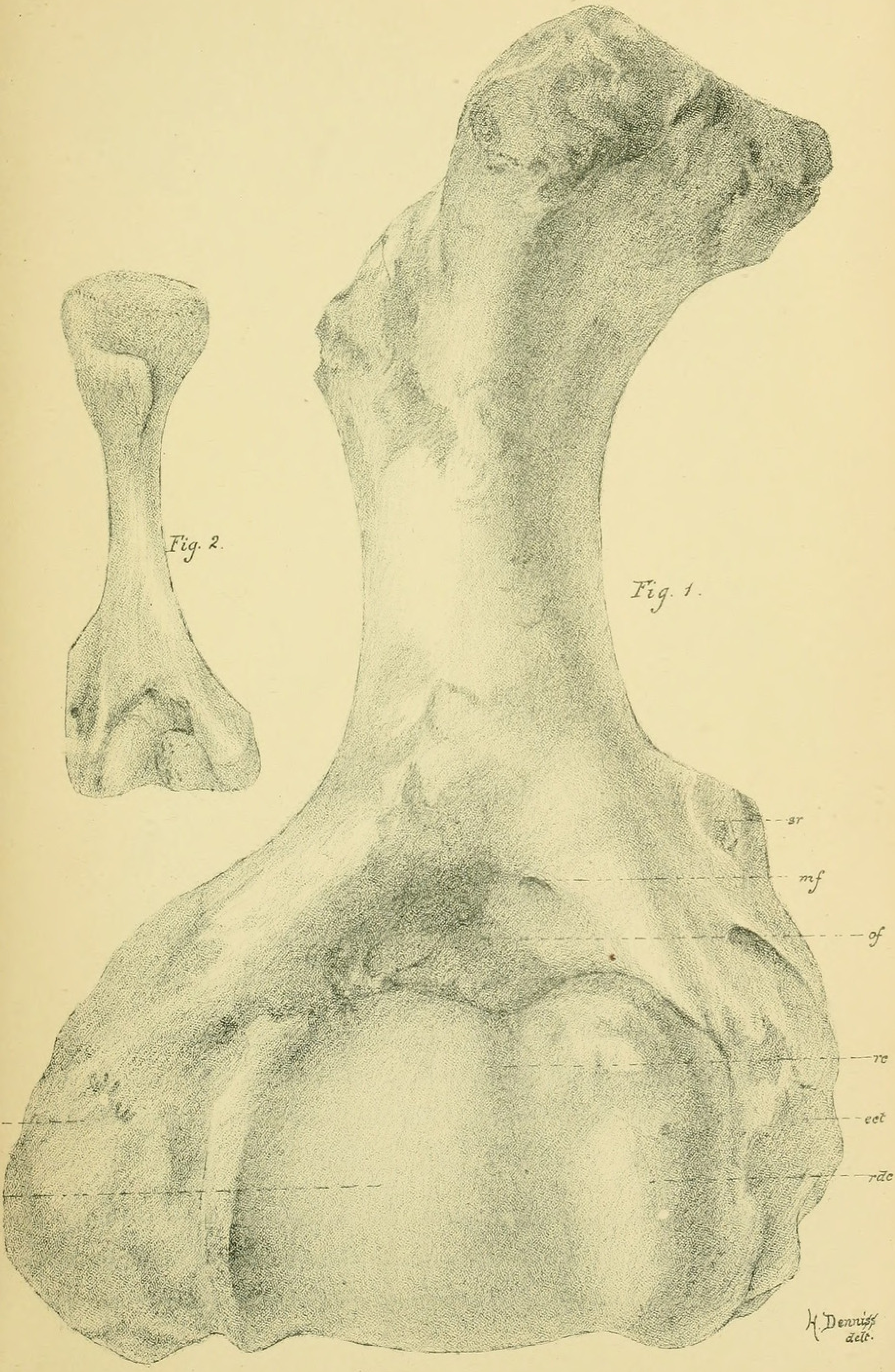

Fig. 2.

Fig. 1.

H. Denniss delt.

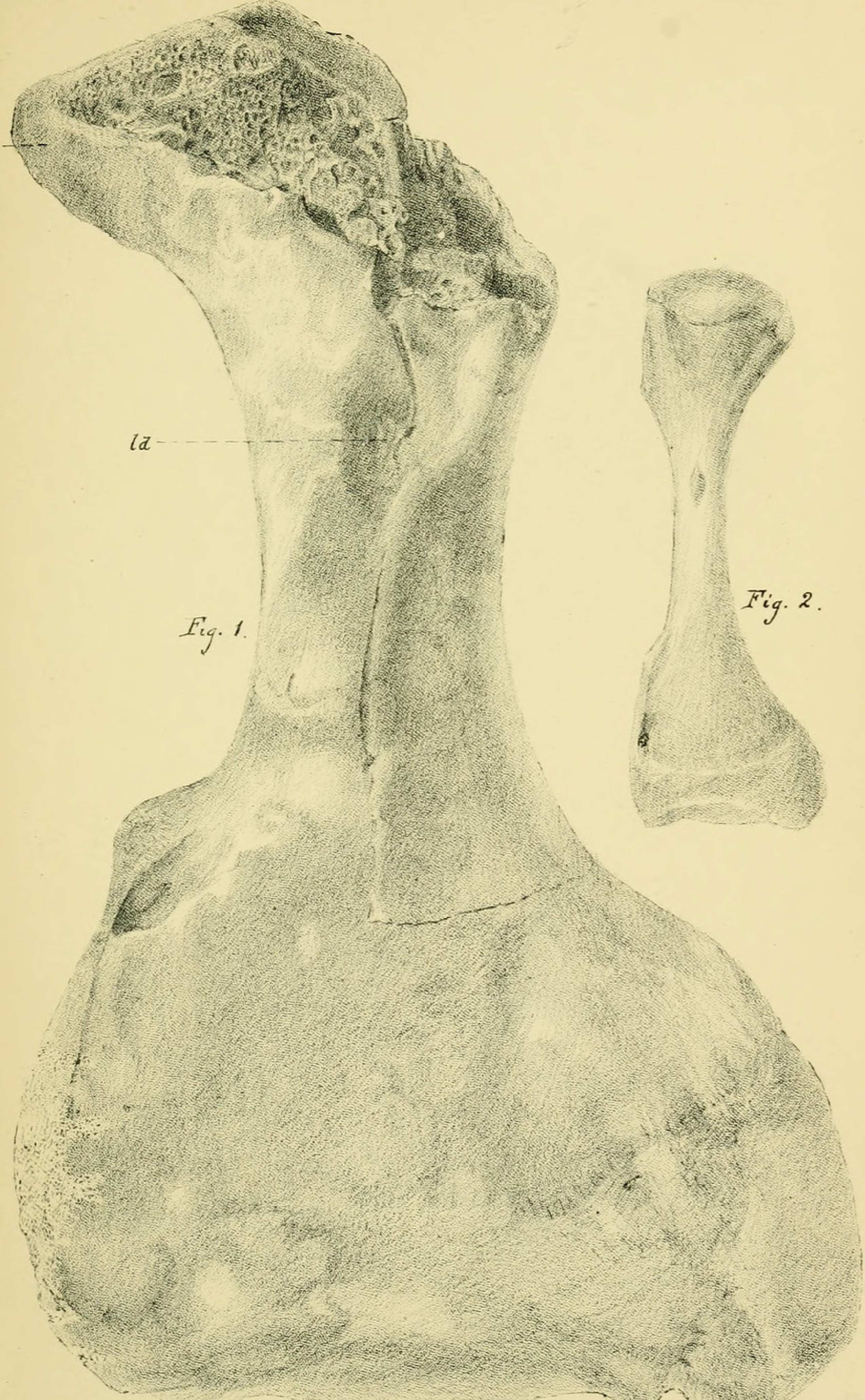

Fig. 1.

Fig. 2.

Fig. 1 *Notiosaurus dentatus*. (Left humerus).

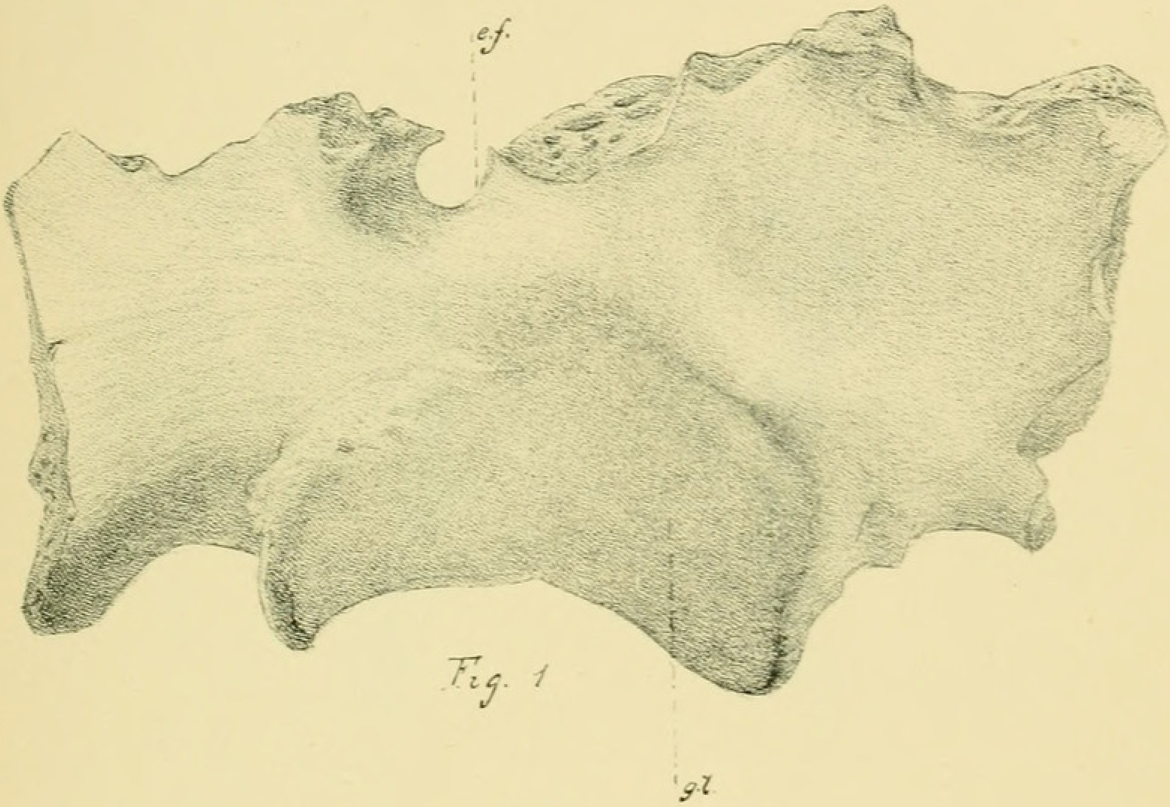

Fig. 1

Fig. 4 Fig. 3 Fig. 2.

Fig. 1. *Notiosaurus dentatus.* (Left scapula).

Fig. 2. " " (Tooth).

Fig. 3. *Hydrosaurus giganteus* ".

Fig. 4. *Odatria punctata* ".