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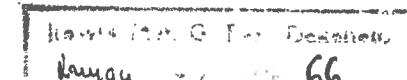
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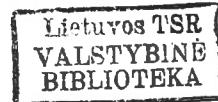
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J. A. DALINKEVIČIUS

ON THE FOSSIL FISHES  
OF THE LITHUANIAN CHALK  
I. SELACHII

LIETUVOS KREIDOS  
FOSILINĖS ŽUVYS

I. SELACHII



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## I. INTRODUCTION.

Geological researches of the Lithuanian cretaceous beds during the last few years brought to light the presence of various layers with very complicated and irregular tectonic, produced by the movement of glaciers. The fauna which is included in these layers allows to regard them as belonging to two lithologically different series: the upper series of strata of white and gray marls (white and gray chalk), almost without any admixture of sand, and lower one, consisting of greenish black and gray sandy muds and sands. The age of these strata varies from Campanian till Cenomanian, the distinct lithological limit between two mentioned series being the glauconitic sandy marls with *Actinocamax plenus* Blv.

Besides these beds there were found the strata of greenish black and dark gray muds and sands which in the contrary to the Upper Cenomanian beds are completely limebare and very poor in fauna. These beds occur in the exposures of the lower courses of the rivers Šventoji and Neris (Wilija). They are mostly covered by quaternary clays and sands; the middle devonian Old Red underlies them. Up to the present day no direct data of exposures and bore holes have been got as to their proper position with regard to the cretaceous and tertiary beds. It is noteworthy that no other fauna, except fossil fishes, has been found in these beds. Some peculiarities of its contents had made difficult the prompt inference as to the age of these glauconitic muds and sands, until the ichthyic fauna from the undoubtedly cretaceous beds was collected. The correlation of these faunas, especially with that of the Upper Cenomanian, allows to infer that the mentioned beds belong to the horizons situated below the beds with *Actinocamax plenus*.

According to the last researches the following section of the Lithuanian cretaceous beds was obtained:

Known only from bore holes:

Maestrichtian and Upper Campanian: white chalk with cherts; *Belemnitella mucronata* Schlotheim.

There are to be found in exposures:

Lower Campanian: white and light gray marls (chalk) with *Actinocamax mammillatus* Nilss.;

Upper Santonian: light gray marls with *Actinocamax mammillatus* Nilss. praem. *bornholmensis* Stolley;

probable interruption of sedimentation

Lower Coniacian: gray marls with *Actinocamax westfalicus* Schlüter;

Turonian: light gray marls with flints and phosphate nodules; *Rhynchonella octoplicata* Sow.; greenish black and dark gray sandy, chalky muds with *Actinocamax plenus* Blv.;

Cenomanian: greenish glauconitic calcareous sandy muds with phosphate nodules; greenish black and dark gray sandy muds with fish remains;

Gault: greenish light sands with insertions of the bands of white and black clay.

In this communication will be given a preliminary account of the Selachian fauna of the Lithuanian cretaceous beds. The description of the other fossil fishes, as well as of the other organic remains, will appear in later communications.

I have sincere pleasure in expressing my great indebtedness to Prof. M. Leriche of the Université Libre in Brussels, whose advices were especially valuable for me; to prof. V. van Straelen, Director of the Musée Royal d'Histoire Naturelle de Belgique and to Prof. F. Demantet, Keeper of this Museum, for kindnesses, giving me the opportunity of studying collections of fossil fishes of Belgium. I am particularly indebted to the Faculty of Sciences of the University of Vytautas the Great in Kaunas for granting me the possibility to work at that fauna abroad; to Prof. F. Heritsch of Graz University, to Prof. E. Stromer von Reichenbach of Munich University and Dr. W. Weiler in Worms, who in one way or another have so readily helped me in this work.

## II. SYSTEMATIC DESCRIPTION OF THE FISHES

### Sub-class Elasmobranchii

#### Order Selachii

#### Family SPINACIDAE

Genus *Acanthias* Risso

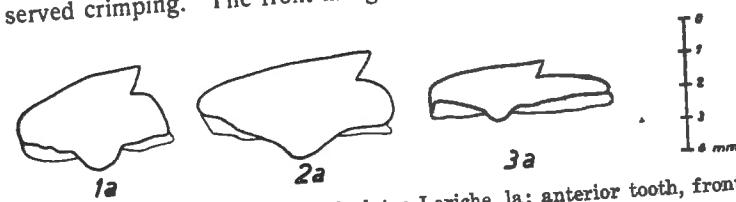
(Syn. *Squalus* Linnaeus)

*ACANTHIAS APPENDICULATUS* Leriche, 1929  
(Pl. I, figs. 1-4; text-figs. 1-3)

*Acanthias appendiculatus*. — M. Leriche, p. 204.

MATERIAL. Upward two hundred and fifty well preserved isolated teeth.

DESCRIPTION. The front sharp edge of the crown generally is completely smooth, seldom with an irregular, scarcely observed crimping. The front margin of the crown is straight, being



Figs. 1-3. *Acanthias appendiculatus* Leriche. 1a: anterior tooth, front face; 2a: lateral tooth, front face; 3a: posterior lateral tooth, front face.

somewhat arched only in the Anterior teeth. The hinder edge is considerably inclined and sharply notched; the notch is completely smooth. The "branches" (stays) of the root of the Anterior tooth make very obtuse angle which widens towards the corner of the jaw. Both the root branches of the Lateral and Posterior lateral teeth are almost horizontal. The largest specimen (Lateral tooth)

has these dimensions: width (along the base of the tooth) 6,2 mm, height 3,3 mm, thickness 1,9 mm. The relation: width to thickness in all the teeth of this species is  $1,7 \pm 0,2$ ; the relation width to height increasing from the Anterior teeth backwards changes from 1,7 to 3,2; that of width to thickness — from 2,7 to 5,6.

The downward extension of enamel is larger and broader on the front teeth than on the hinder ones, where it forms a narrow but relatively long downward additament.

These *Acanthias* teeth are mostly similar to those which are known from Maestrichtian of Limbourg. M. Leriche identifies the latter with *Corax appendiculatus* Agassiz (L. Agassiz, 1843, vol. III, p. 227, pl. 26a, figs. 18—20). The latter has a distinct regular serration even on the notch of tooth, — a feature which was not observed on the numerous Lithuanian and Limbourian specimens. On the other hand, I do not find yet possible to deal with the described *Acanthias* teeth as belonging to a species, different from that of Limbourg.

Some broken off teeth of *Acanthias* were found in the beds of Lower Senonian.

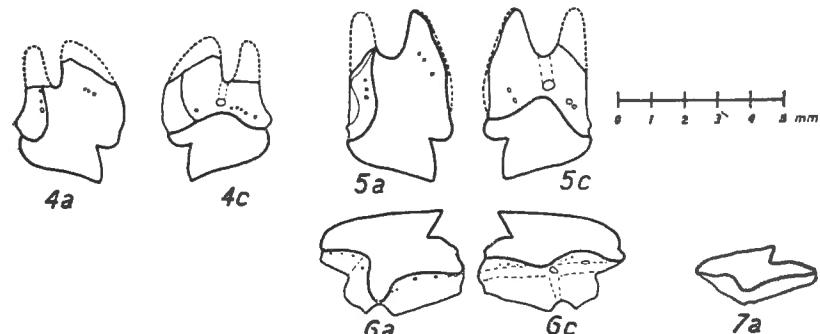
OCCURRENCE. Very common in greenish black muds of the Sventoji and Neris rivers; Papiškiai; zone of *Actinocamax plenus*: Veršvai, Naukiemis; Turonian zone with *Rhynchonella octoplicata*: Jakštūnai, Kaunas, Skirsnemunė; Campanian zone of *Actinocamax mammillatus*: Skirsnemunė.

#### Genus *Centrophorus* Müller and Henle

##### CENTROPHORUS (?) BALTICUS nov. sp. (Pl. I, figs. 5—9, text-figs. 4—7)

The strata with *Rhynchonella octoplicata* have furnished a number of *Acanthias* — like teeth, whose outer (aboral) face is less overlapped by enamel than in the very *Acanthias* ones. Besides all that they are considerably higher, narrower and thinner than those of the formerly described species. The Lateral tooth has these dimensions: width 5,0 mm, height 4,6 mm, thickness 1,7 mm, the relation of width to thickness in all these teeth being  $2,7 \pm 0,2$ . The relation width to height increasing from the Anterior teeth backwards changes from 1,0 to 1,9; that of width to thickness — from 1,8 to 4,5.

Besides these teeth there were found some thin lanceolate ones which undoubtedly belong to the same species. All the teeth are tall, the relation for Lateral tooth width to height being ca 0,6 and height to thickness — ca 5. The main cusp and notch are similar to those of *Acanthias* teeth. The large outer face is covered with enamel, except a small sinuosity which probably was in connection with the notch of the adjacent tooth.



Figs. 4—7. *Centrophorus* (?) *balticus* nov. sp.: 4a: left upper anterior tooth, front face; 4c: ditto, inner face; 5a: left upper lateral tooth, front face; 5c: ditto, inner face; 6a: left lower lateral tooth, front face; 6c: ditto, inner face; 7a: left lower posterior lateral tooth, outer face.

I treat the former *Acanthias* — like teeth as presumably belonging to a dentition of the lower jaw of *Centrophorus* and the latter high ones — to the upper jaw of the same species.

There is known *C. primaevus* Pictet from Turonian of Mount Lebanon; but for an incomplete description of teeth of this species and since its upper teeth are unknown (Woodward, 1889, p. 32), a strict comparison of these two species at this moment is impossible.

#### Family SQUATINIDAE Genus *Squatina* (Aldrovandi) Duméril (Syn. *Rhina* Klein)

##### SQUATINA DECIPIENS nov sp. (Pl. I, figs. 10—17).

MATERIAL. About two hundred and fifty isolated teeth.

DESCRIPTION. The crown of the teeth is smooth, slender and sharply edged; both faces of the crown are slightly promi-

nent, so that the convexity of the inner face generally is a little larger than that of the outer face of the tooth. The crowns of the lower teeth have a distinguishable sigmoidal curvature when viewed from the front or hinder side; the adult Lateral teeth have the upper half of the crown decidedly bent outward; the crown of Lateral teeth slope to the rear. The crowns of the adult teeth are stouter than those of the young ones. The median downward extension of the crown on the front of the root projects a little beneath of the root. The shape of this generally short process largely varies and therefore it cannot be reputed as a distinctive feature to a species. The stays of the root of the Anterior teeth form an obtuse angle (i. e. root deeply excavated below) which widens towards the corner of the jaw; the roots of Posterior lateral teeth are horizontal.

The numerous specimens allow a reconstruction of the dentition of both jaws. The following relations were obtained between the width, height and thickness of the teeth:

Upper jaw:

width to height . . .	= 1,1 — 1,2	Anterior	Lateral	Posterior lateral
width to thickness . . .	= 1,6 — 1,8		1,3	→ 1,9
height to thickness . . .	=		1,9	→ 2,4

middle 1,4 ± 0,1

Lower jaw:

width to height . . .	= 0,8 — 1,0	1,3	→ 1,9
width to thickness . . .	= 1,3 — 1,4	1,8	→ 1,9
height to thickness . . .	=		middle 1,4 ± 0,1

The largest Lateral tooth has the following dimensions: width (along the base) 9,0 mm, height 5,0 mm, thickness 4,5 mm.

It is difficult to find out distinctive features in the teeth of the different species of *Squatina*. That is why the descriptions of many species, based upon an insufficient material, are incomplete and contain sometimes accidental features, treated by their authors as essential ones. The use of these descriptions becomes especially painful and leads to some uncleanness, when dealing with numerously collected, various material. Notwithstanding a great diversity of different features of the collected teeth

as to the size, convexity of their faces, slenderness of crowns, curvature, sloping to the rear, the dimensions of the downwardly-directed process of crown, there is no ground to ascribe them to different kinds, since their diversity mostly depends either upon the position in the jaw or on the maturity. *Squatina prima* Winkler from Lower Landenian of Belgium can be distinguished from our species by having somewhat more rhomboidal shape of the root even in the Lateral teeth (M. Lerche, 1902, p. 16, pl. I, figs. 18—20)\*. Only the largest teeth, collected in the same beds of Lithuania, seem to resemble the robust teeth of *S. hassei* Lerche from Maestrichtian of Limbourg (M. Lerche, 1929, p. 206, figs. 1—3). *S. baumbergensis* v. d. Marck from Senonian of Westphalia (1885, p. 264, pl. 5, fig. 2), *S. mülleri* Reuss (1846, p. 101, pl. XXI, figs. 18—20) from Cenomanian and Turonian of Bohemia and *S. cranei* A. S. Woodward from Cenomanian of England have many common features with the described species from Lithuania, but they all are considerably smaller than the former. With regard to the slenderness of the crown and the shape of the root, *S. cranei* would be the most proper kind to which our teeth could be referred, unless its size be twice smaller than that of the Lithuanian species. Finally *S. aegyptiaca* Stromer from the Lowest Cenomanian of Egypt (1927, p. 7, pl. I, figs. 1—3), for its extremely long downwardly-directed process and shape of the root, suits our species in the least.

Besides these teeth some broken off or very small ones of *Squatina* were found in the different cretaceous beds of Lithuania.

OCCURRENCE. Very common in greenish black muds of the Šventoji and Neris rivers; Papiškiai; zone of *Actinocamax plenus*; Veršvai, Naukiemis.

\*) The teeth of *Squatina prima* Winkler from Ypresian, figured by E. I. White (1931, p. 68, figs. 87—93), are twice as large as those of Lower Landenian, pictured by Lerche (l. c.).

Family SCYLLIIDAE

Genus *Scylium* Cuvier

*SCYLIUM ANTIQUUM* Agassiz, 1843  
(Pl. I, fig. 18)

*Scylium antiquum*. — A. S. Woodward, 1911, p. 194,  
pl. XLII, figs. 1—4; (with synomimic).

MATERIAL. One well preserved Anterior lateral tooth.

DESCRIPTION. Dental crown is rounded in section, straightly elevated, but short; the apex of the crown is sharp. The side-lines separating the inner face of the crown from the outer one have slightly expressed sigmoidal curvature. The principle cusp is flanked by one pair of short, pointed denticles which are slightly divergent. The second pair of them is rudimentary. The base-line of the crown is arched and provided with striae as well as both faces of small denticles; the inner face of the principle cone is smooth. The root is stout, short but bifid; it projects deeply inward; its inner apex is pierced by a conspicuous cleft for foramen nutritive, thus forming two rounded prominences.

This tooth bestly corresponds to *Scylium antiquum* Agassiz. Some difference is that the inner face of the crown is free of striae, while the specimens from the English Cenomanian mostly have fine vertical striation.

The described tooth is 4,1 mm wide (along the base of the crown), 3,8 mm high and 2 mm thick, i. e. a little larger than specimens figured by Woodward.

OCCURRENCE. Zone of *Actinocamax plenus*; Naukiemis.

*SCYLIUM* sp.

The greenish black muds of the Šventoji river furnished one 2,5 mm high tooth which no doubt belongs to *Scylium*. The crown is stout and rounded with both faces bearing distinct striations which rise up to more than half of the crown. One pair of acute denticles is parallel to the main cusp; the denticles are provided with striae. The root is broken off.

The form of the crown and disposition of the denticles are different from the kind described above.

Family ORECTOLOBIDAE

Genus *Ginglymostoma* Müller and Henle

*GINGLYMOSTOMA LITHUANICA* nov. sp.  
(Pl. I, figs. 19—20)

MATERIAL. Three detached teeth.

DESCRIPTION. The teeth which were examined belong to the Lateral and Posterior lateral part of the jaw. The Lateral teeth 5,5 mm long, form an arched keel, dissected in the principle acuminate cusp and 3—5 pairs of closely connected lateral denticles (feathers). All the denticles are separated from each other by grooves which radiate from the keel towards the base of the outer face of the crown; but a few of them reaching the edge of it. Between the two principle grooves, separating the main cusp from the denticles, there are a few additional folds (three in number) which rise up only a little from the base of the crown. The principle cusp, as well as the lateral denticles, is more prominent on the inner face than on the outer. The enamel of the outer face of the crown overlaps the root. The root is bifid; foramen nutritive opens in a small prominence which is formed by both wings of the root converging. A few perforations in the upper portion of the root are to be seen on both faces of the tooth.

The Posterior lateral tooth has only one cusp, the longitudinal keel being not differentiated. The outer face of its crown has only indistinct traces of folds.

This species is distinguished from the other cretaceous and tertiary *Ginglymostoma* by the presence of folds on the outer face of the crown which is mostly smooth on those species already known. The large *Ginglymostoma minutum* Forir (1886, p. 35, pl. 11, figs. 2—3) from Maestrichtian is one of the *Ginglymostoma* which has this face folded; but a great difference in the size and shape of the keel and number of denticles does not allow these to be considered identical.

OCCURRENCE. Greenish black muds of the Šventoji and Neris beds; zone of *Actinocamax plenus*; Veršvai.

GINGLYMOSTOMA PARVULA nov. sp.  
(Pl. I, fig. 21)

MATERIAL. One perfectly preserved tooth.

DESCRIPTION. The main cusp is rounded in section and tapers rapidly to the apex which is sharp. The crown is wide at the base and flanked by two pairs of indistinctly differentiated denticles. All the outer face is coarsely folded, the inner face of the principle cusp being smooth. The principle cusp has a -line and horizontal extension covering the inner prominence of the root. The root, viewed from the base, is triangular in shape; basilar face is flattened and bears a horizontally stretching cleft for the foramen nutritive. The edges of the root have numerous perforations.

OCCURRENCE. Greenish black muds of the Šventoji and Neris beds.

Family CESTRACIONTIDAE  
Genus *Cestracion* Cuvier

CESTRACION CANALICULATUS Egerton 1850  
(Pl. I, figs. 22—28)

*Cestracion canaliculatus*. — A. S. Woodward, 1911,  
p. 214, pl. XLV, figs. 1—5 (with synonymic of the species).

MATERIAL. About ten Anterior and forty Lateral isolated teeth.

DESCRIPTION. Teeth of small size, the largest Lateral one being 8 mm long. All the teeth are slightly sigmoidally curved, with a distinct longitudinal prominent keel. Median eminence on some specimens is considerable, being in the middle of the tooth as high as it is wide and equal to one third of the length of the tooth. This prominence is smaller on the Posterior and the curvature of the longitudinal keel vary considerably, probably depending upon the position of the teeth in the ramus of the jaw. The reticulation of the surface is prominent, irregular,

fine, with rather coarser folds on the inner side of the crown (i. e. behind the keel) than on the outer one.

The Anterior cuspidate teeth of this species have a principle cone smooth, short and stout, margined with one or two pairs of denticles; the second pair of them is little developed and appears only on two specimens, as rudimentary prominences. The basilar deeply arched prolongation of the enamel of the crown on the outer face hides from the front view all the inner hollow between the wings of the root; the latter is triangular in shape. The prominence, formed by the convergence of these wings (inner apex), is partly covered by an enamel which is joined to that of the crown. A horizontal foramen nutritive pierces the inner prominence of the root; the vertical channels are directly under the principle cone and denticles.

OCCURRENCE. Greenish black muds of the Šventoji and Neris beds; Papiškiai; zone of *Actinocamax plenus*: Veršvai.

CESTRACION UPNIKENSIS nov. sp.  
(Pl. I, figs. 29—38)

The greenish black muds of the Šventoji and Neris beds furnished a few cuspidate teeth which undoubtedly belong to *Cestracion*; but their reference to *C. canaliculatus* is yet doubtful. These teeth are quite free of lateral denticles. Their crown is smooth, short and stout; both faces of it are prominent, the apex being bent inwards. The enamel of the crown overhangs the wings of the bifid triangular root. The foramen nutritive opens in a short groove of the inner apex. There is a number of perforations in a deep hollow of the underside of the root. The baseline of the outer face of the crown is arched.

To Lateral teeth of this species presumably can be referred some specimens of which ornamentation is coarser than in the above described species. The mentioned teeth have also a smaller prominence of the crown.

A small number of broken off specimens of *Cestracion* was found in the beds of *Actinocamax mammillatus*. They are larger than the species described here and are provisionally referred to *Cestracion cf. rugosus* Agassiz.

Genus *Acrodus* L. Agassiz

*ACRODUS GIEDROYCI* nov. sp.  
(Pl. I, figs. 84—85)

MATERIAL. Five broken isolated teeth.

DESCRIPTION. The main cusp is round and pointed, with longitudinal sharp low keel, from which, as well as from the apex, mostly transversely radiate irregular, broken, anastomosing and bifurcating coarse ridges. The present material suggests that there are no differentiated lateral denticles, besides a rounded principle cone with the ridges radiating from the apex. For their comparatively large size and complicated arrangement of the coarse and closely displaced ridges, the teeth of this species can be easily distinguished from: *Acrodus ornatus* A. S. Woodward (1889, p. 296, pl. XIII, fig. 10) from Wealden of Isle of Wight, from *A. levis* A. S. Woodward (ib. pl. XIV, figs. 5—7) from Gault and from *A. nitidus* A. S. Woodward (ib. pl. XIV, fig. 8).

I give this species the name in honour of Prince A. Giedroyć (Giedraitis), the explorer of the Lithuanian Chalk of the last century.

OCCURRENCE. Greenish black muds of the Šventoji and Neris beds; zone of *Actinocamax plenus*: Veršvai.

Genus *Hybodus* L. Agassiz

*HYBODUS (POLYACRODUS) GREWINGKI* nov. sp.  
(Pl. I, figs. 36—38)

MATERIAL. Twenty isolated teeth.

DESCRIPTION. The present teeth have a principle blunt cusp and one pair of well developed, widely spaced lateral denticles (beads). The second pair of beads appears irregularly on the ends of the teeth and is closely connected with the first pair. A sharp longitudinal keel (ridge) goes through the top of the main cusp and those of the lateral denticles. A number of more or less distinct, irregular, rare wrinkles radiate from the short and stout apices or directly downwards from the longitudinal keel, being more numerous on the inner, rather flattened face than on

the outer one; the latter is thus smoother. The principle cusp is more elevated and the lateral denticles (beads) better differentiated in the Anterior teeth than on the Lateral ones; there is no sign of lateral denticles on the Posterior lateral teeth (fig. 38). On the outer more prominent face of the crown of the present specimens irregular lateral excrescences occur beside the principle cone and lateral beads. The base-line of the crown is slightly arched.

These teeth somewhat resemble those of *Hybodus (Polyacrodus) woodwardi* Dollo from Santonian of Belgium (M. Lerche, 1929, p. 225, figs. 4—5). Lerche identifies this species with *Synechodus illingworthi* A. S. Woodward (1911, p. 220, pl. XLVI, fig. 7, not 5—6) from Cenomanian; the latter has up to four pairs of additional denticles. The small size of our species (the largest tooth is ca 100 mm in length) and small number of pairs of lateral denticles (beads), differ our kind from these species.

The name of this species is dedicated to the memory of C. Grewingk, through whose researches the cretaceous sediments in the Baltic states were first discovered.

OCCURRENCE. Greenish black muds and sands of the Šventoji and Neris beds.

Genus *Synechodus* A. S. Woodward

*SYNECHODUS NITIDUS* A. S. Woodward  
(Pl. II, figs. 39—49)

*Synechodus nitidus*. — A. S. Woodward, 1911, p. 219, pl. XLVI, figs. 3—4.

MATERIAL. Over one hundred perfectly preserved detached teeth.

DESCRIPTION. The main cusp is rounded, slender and elevated in the Anterior teeth and stout in the Posterior ones; in the Anterior lateral teeth it shows oblique sigmoidal curvature when viewed from the rear or side. Principle cones of all teeth are flanked at least by three pairs of sharply pointed denticles: the number of them on both sides of the teeth is unequal, being

6 or 7 before the front margin of the Anterolateral teeth and 3 or 4 on the hinder side. In the Posterior lateral teeth the denticles are 4—6 in number, both alike in front and rear. On the small (young?) specimens of the Anterior and Lateral teeth, instead of well marked and differentiated lateral denticles, we can see only a fine denticulation and distinct vertical wrinkles on both faces of the crown. The height of the crown grows from the Anterior teeth to the Anterolateral ones and decreases backwards as the corner of the mouth is approached. The main cone in the Anterolateral teeth is generally decidedly inclined. The relation between the size of the main cone and denticles is the greatest in the Anterior teeth; this relation decreases for the Lateral teeth. In the Posterior lateral teeth the lateral cones are reduced to small striated tubercles or points (beaded teeth). The principle cone, denticles and continuous base of the teeth are marked with fine wrinkles. The nearer the tooth is to the corner of the jaw, the rougher is the striation; the latter is better conspicuous on the teeth of young individuals than on those of old ones. Large specimens of the Anterior teeth often have a completely smooth oral face or but very fine striation at the base of the crown; the small specimens are mostly finely striated. Some large Anterior teeth are completely smooth on both faces. The base-line of the crown is gently arched. The outer face of the base in Anterior teeth of some specimens is flat or even concave.

The root of the teeth is but little developed. The branches of the root in the Anterior teeth form an angle of about 120° (the teeth are in the form of a triangular star); this angle widens and the base lengthens backwards. There is a number of perforations just under the principle cone und denticles. The base of the root is flattened on its attached face; in the Anterior and Lateral teeth it is crimped along the outer border and deeply protects beyond the inner face of the crown.

These numerously found teeth closely resemble those of *Synechodus nitidus* A. S. Woodward from the English Cenomanian. It is probable, that among the small specimens which I refer to the Posterior lateral and partly to Lateral teeth, there are some belonging to *Synechodus dubrisiensis* Mackie (A. S. Woodward, 1911, p. 217, pl. XLV, figs. 6—7, pl. XLVI, figs. 1—2). But it was impossible to make a limit between

these two possible species in the Lithuanian material; the existence of a gradual transition between presented different teeth is undoubtedly.

OCCURRENCE. Greenish black muds and sands of the Šventoji and Neris rivers; Papiškiai; zone of *Actinocamax plenus*: Veršvai, Naukiemis; zones of *Rhynchonella octoplicata* and *Actinocamax westfalicus*: Jakštūnai, Skirsnemunė.

**SYNECHODUS RECURVUS Trautschold, 1872**  
(Pl. II, figs. 50—58)

*Sphenodus recurvus*. — H. Trautschold, 1872, p. 335,  
pl. V, fig. 4.

*Synechodus recurvus*. — A. S. Woodward, 1911, p.  
221, pl. XLVI, fig. 8.

MATERIAL. Over sixty isolated teeth.

DESCRIPTION. The main cusp is slender and compressed, with acute lateral edges; they have a distinguishable sigmoidal curvature; both surfaces of the teeth are striated near the base, the striae on the inner face being fainter than those on the outer face. On the Lateral teeth the striae are coarser than those on the Anterior teeth. The inner face is deeply convex; the aboral face has a slight prominence, larger on the Anterior teeth than on the Lateral ones. The main cone is flanked by very sharp denticles, a number of which have not fewer than two on each side. In such cases when only one well developed denticle is to be seen on the hinder side of the main cusp, a small undeveloped bead (tubercle) appears by the side of this denticle. On the Lateral and Posterior lateral teeth the number of denticles is greater, being 3 or 4 on the front side and 2 or 3 on the hinder one. The height of the denticles depends upon their position in the ramus and varies from about one third (or less) to one half of the main cusp's height. All the denticles are coarsely striated, with acute lateral edges, and are irregularly disposed (parallelly, divergently, more or less inclined inwards). All the denticles are separated from one another and from the cusp. The base of the crown is straight under the main cusp and slightly arched under the denticles, more so under the front than the rear ones.

The root is robust and vary large, being on well preserved examples of lateral teeth always longer than the height of the whole tooth. All the teeth are more or less bent inwards. The outer edge of the root is coarsely crimped. The basilar face of the root is intersected by furrows which form loops. On well preserved root specimens one can see the channels perforating throughout the the root.

The differences, which can be noted in different teeth, can be reduced: 1. to the height of denticles, 2. to a smaller or larger prominence of the outer face of the main cusp, 3. to a sigmoidal curvature of cutting edges, 4. to a number of denticles, or 5. to more or less distinct striation of the crown. All these differences, when the position of the teeth is not strongly in the ramus indicated, are not essential and insufficient to treat the described teeth as belonging to different species. The most important features of the above described species are the following: 1) large size of teeth (the largest hitherto found, being in length — along the base — 20 mm, in height — 18 mm, in thickness — 7 mm); 2) the striae at the base of both faces; only some Anterior teeth are free of striae on the outer face (see below); 3) the robust root which is flattened on the outer face and gently rounded on the inner one; 4) all the crown is bent inwards when the tooth is placed upright (figs. 51 e, 58 e).

Among the described teeth which I refer to *Synechodus recurvus* there are two Anterior teeth with the outer face completely smooth but not worn off and the inner face of the crown faintly striated at its base. One of them has no sigmoidal curvature to be seen on the sharp edges of its crown, while the other has it. The outer face of the crowns is slightly convex, forming a weak sinus at the base. The tooth figured on the plate II (fig. 50) has two not differentiated denticles (beads) on the front side and two sharp denticles — on the rear one. This specimen has a distinct sigmoidal curvature. Since the general shape of these teeth is like that of *S. recurvus*, I keep them in the limits of this species, unless a newly collected material, especially that of lateral teeth, will show that they must be treated, as belonging to the other species or variation of the *Synechodus recurvus*.

The broken off and difficultly determinable crowns of *S. aff. recurvus* were found in the beds of *Rhynchonella octoplicata* and *Actinocamax mammillatus*.

OCCURRENCE. Greenish black muds of the Šventoji beds; Papiškiai.

**SPINAX MAJOR** Agassiz, 1843  
(Pl. II, fig. 59)

*Spinax major*. — L. Agassiz, 1843, vol. III, p. 62, pl. Xb, figs. 8, 10—14.

*Spinax major*. — H. B. Geinitz, 1875, II p., p. 211, pl. 40, figs. 36—38.

MATERIAL. Three broken fin-spines.

REMARKS. The fin-spines are compressed, the relation between the thickness and width being 0,66; the base of insertion is deep. The upper portion of the spine is covered with ganoine, of which the streaks of growth are distinctly to be seen. Its posterior portion is longitudinally channeled, but without denticles on the margins of the groove. A narrow inner cavity, rapidly tapering to the apex, longitudinally perforates the fin-spine.

The fin-spines described above evidently belong to *Synechodus (nitidus?)*, for the spine of *Cestracion*, described by A. S. Woodward (1911, pp. 216—217), is hollow, with thin walls; whereas the Lithuanian specimens are more solid, with only a narrow longitudinal channel.

OCCURRENCE. Greenish black muds of the Šventoji beds; Papiškiai; zone of *Actinocamax plenus*: Veršvai.

**Family NOTIDANIDAE**

**Genus Notidanus Cuvier, 1817**

**NOTIDANUS MICRODON** Agassiz, 1843  
(Pl. III, fig. 60)

*Notidanus microdon*. — J. W. Davis, 1890, p. 380, pl. XXXVIII, fig. 4—7.

*Notidanus microdon*. — A. S. Woodward, 1911, p. 222, pl. XLVII, figs. 1—6 (with the synonymic of the species).

REMARKS. One well preserved tooth, found in the beds with *Rhynchonella octoplicata*, undoubtedly belongs to the upper

jaw of this species. The principle cusp is relatively large, slender, and acutely pointed. There are three posterior (secondary) denticles; one or two of them are broken off. The lower part of the anterior margin of the principle cusp has fine, but well marked denticulation. All denticles are biconvex and sharply pointed. The width of the teeth attains 1,2 cm. The root is deeper than the height of the principle cusp; the base-line of the crown is arched.

Besides that tooth, there were found in the Turonian beds several broken off large, biconvex cusps which belong to another, evidently larger species of *Notidodus*. The broken off teeth of *Notidodus* were also found in other cretaceous beds of Lithuania.

#### Family PTYCHODONTIDAE

##### Genus *Ptychodus* Agassiz

###### *PTYCHODUS DECURRENS* Agassiz, 1839

*Ptychodus decurrens*. — J. W. Davis, 1890, p. 376, pl. XXXVIII, figs. 1—2.

*Ptychodus decurrens*. — A. S. Woodward, 1912, p. 239, text-figs. 70, 71, 76 and 77; pl. LI and LII.

*Ptychodus decurrens*. — M. Leriche, 1929, p. 209.

MATERIAL. Three broken isolated teeth.

DESCRIPTION. The median portion of the crown of the largest tooth is gently raised and crossed by six regular, straight, fine, transverse ridges (the whole tooth had presumably 10—12 ridges); the small specimens of the Lateral teeth are crossed by 8—10 ridges. The marginal area is covered with fine marks more or less radiating downwards.

OCCURRENCE. Zone of *Actinocamax plenus*: Veršvai, Naukiemis; zone of *Rhynchonella octoplicata*: Skirsnemunė.

###### *PTYCHODUS LATISSIMUS* Agassiz, 1843 (Pl. III, fig. 61)

*Ptychodus latissimus*. — A. S. Woodward, 1912, p. 235, pl. L, text-figs. 74—75.

*Ptychodus latissimus*. — M. Leriche, 1929, p. 211.

MATERIAL. One slightly damaged Lateral tooth.

REMARKS. The median portion of the tooth is gently raised and crossed by five complete, coarse, transverse ridges; the sixth beaded ridge is frontal. The marginal area is more or less coarsely granulated.

OCCURRENCE. White chalk of Pajiesys (Kaunas).

###### *PTYCHODUS MAMMILLARIS* Agassiz, 1839

(Pl. III, fig. 62)

*Ptychodus mammillaris*. — A. S. Woodward, 1912, p. 230, pl. XLVII, figs. 13—27, text-fig. 72.

*Ptychodus mammillaris*. — M. Leriche, 1929, p. 210.

MATERIAL. Four Lateral broken isolated teeth.

REMARKS. The median portion of the crown is decidedly raised; its upper surface is crossed by regular, fine transverse ridges from eight to ten in number which pass down the sides and are continued into somewhat wavy, concentric lines of well conspicuous marginal granulations. The granules are mostly considerably elongated and, being arranged in lines concentric with borders of the crown, cover all the relatively wide sloping down marginal area.

OCCURRENCE. Zone of *Actinocamax plenus*: Veršvai, Naukiemis; zone of *Rhynchonella octoplicata*: Skirsnemunė.

###### *PTYCHODUS RUGOSUS* Dixon, 1850

*Ptychodus rugosus*. — A. S. Woodward, 1912, p. 231, pl. XLVIII, figs. 1—11.

*Ptychodus rugosus*. — M. Leriche, 1929, p. 214.

REMARKS. One small Lateral tooth from the beds of *Actinocamax mammillatus bornholmensis* (Lower Campanian — Upper Santonian) of Skirsnemunė undoubtedly belongs to this species.

The median portion of the tooth is extremely elevated and crossed by five regular transverse ridges. The rear side of the crown is free of ridges and bears a few irregularly displaced granules. The whole sloping down periphery is smooth. The borders of the marginal area are covered with granulations arranged in concentric lines, as on the teeth of *P. mammillaris*.

Family LAMNIDAE

Genus *Corax* Agassiz

**CORAX FALCATUS** Agassiz, 1843  
(Pl. III, figs. 68—67)

*Corax falcatus*. — A. S. Woodward, 1911, p. 198, pl. XLII, figs. 16—18, 20—28 (non fig. 19, non text-fig. 59).

*Corax falcatus*. — M. Leriche, 1929, p. 219.

MATERIAL. Several well preserved and many broken isolated teeth.

REMARKS. The teeth are comparatively small, with attenuated apex and the anterior margin a little arched or almost straight. The posterior edge of the Lateral and Posterior lateral teeth is sharply notched at the base; a gentle notch is to be seen at the base of the anterior margin of the Anterior lateral teeth. The crowns of the latter are distinctly serrated; the Lateral teeth loose serration as the corner of the mouth is approached. The serration becomes more conspicuous as an individual becomes older. There is no median cleft for the foramen nutritive on the inner face of the root.

OCCURRENCE. Zone of *Actinocamax plenus*: Veršvai, Naukiemis; zone of *Rhynchonella octoplicata*: Skirsnemunė; zone of *Actinocamax westfalicus* (Lower Coniacian): Skirsnemunė: Jakštūnai; zone of greenish black muds of the Šventoji bed (extremely rare).

**CORAX cf. PRISTODONTUS** Agassiz, praem. KAUPI Agassiz, 1843

REMARKS. The anterior margin of the teeth is decidedly arched, the posterior one being distinctly notched. The notch is never separated from the principle cusp. The teeth of this species are a little larger than those of *C. falcatus*, and seem to have the outer face of the crown generally flattened.

All the teeth of this species collected up to the present time in the cretaceous beds of Lithuania are badly preserved.

These teeth are mostly similar to those which are known from the Lower Senonian of West Europe, as *Corax pristodontus* Agassiz praem. kaupi Agassiz (1843, vol. III, p. 225, pl. 26, fig. 4—8,

pl. 26a, 25—34) and also described by Davis, as *Corax lindstromi* (1890, p. 412, pl. XLII, figs. 3—11) and Leriche, as *C. pristodontus* Ag. praem. *kaupi* Ag. (1902, p. 119, pl. III, figs. 66—75; 1929, p. 220).

OCCURRENCE. The beds of white chalk with *Actinocamax mammillatus*: Skirsnemunė, Jakštūnai.

**CORAX ali. JAEKELI** Woodward  
(Pl. III, figs. 68)

MATERIAL. Two detached teeth.

REMARKS. The larger better preserved tooth is 3,4 mm wide and 2,6 mm high; its apex is turned backwards. The anterior margin of the crown is slightly arched, with coarse indistinct serration on its lower half; the posterior margin has four distinctly conspicuous serrations towards the base of the crown. The apex of the principle cusp is but a little larger than the uppermost denticle on its posterior edge. The base-line of the crown is straight or gently arched.

*Corax jaekeli* A. S. Woodward (1911, p. 200, pl. XLIII, figs. 1—3) is that which bestly resembles the described species. Some differences from *Corax jaekeli*, as slightly arched base-line (strongly straight in the type species), a less number of denticles on the posterior margin (four instead of 7—11 of type species) do not permit to entirely identify these species until the more numerous material will be collected.

The Lithuanian specimens, as well as the English ones of *Corax jaekeli*, come from the Lower Senonian (zone of *Actinocamax mammillatus*: Jakštūnai, Pajesys near Kaunas).

Genus *Pseudocorax* Priem

**PSEUDOCORAX LAEVIS** Leriche, 1906  
(Pl. III, fig. 69)

*Pseudocorax laevis*. — M. Leriche, 1929, p. 223.

REMARKS. The present perfectly preserved Lateral tooth is 4,6 mm wide and 3 mm high and has a distinct posterior notch and a scarcely distinguishable anterior one. No serration is to be observed on the margins of the tooth. The base-line of the tooth

is gently arched. The bifid root is provided with a cleft for the foramen nutritive.

The tooth was found in the bed of white chalk with *Actinocamax mammillatus* in Pajiesys (Kaunas).

Genus *Scapanorhynchus* A. S. Woodward

**SCAPANORHYNCHUS RAPHIODON** Agassiz, 1843  
(Pl. III, figs. 70—71)

*Scapanorhynchus (Odontaspis) raphiodon*. — M. Leriche, 1902, p. 106, pl. III, figs. 8—13.

*Scapanorhynchus raphiodon*. — A. S. Woodward, 1911, p. 211, pl. XLIV, figs. 14—17.

MATERIAL. Three detached teeth.

REMARKS. The oral face of the crown is marked with prominent straight striae which are generally parallelly displaced; the borders of the inner face of the crown are quite free of striae. The margins of the crown are very sharp. All the present teeth — one Anterior and two Lateral ones — are provided with one pair of sharp denticles. The root is prominent on its inner face, with a median cleft for a foramen nutritive.

OCCURRENCE. Zone of *Actinocamax plenus*: Naukiemis, Veršvai; zone of *Rhynchonella octoplicata* and *Actinocamax plenus*: Skirsnemunė.

**SCAPANORHYNCHUS RAPHIODON** Agassiz var. *TENUIS* Davis  
(Pl. III, figs. 72—75)

*Scapanorhynchus tenuis* (pars). — J. A. Davis, 1890, p. 385, pl. XXXVIII, figs. 10, 11 and 13 (non 12).

MATERIAL. About twenty isolated teeth.

REMARKS. The general character of the teeth of this variation is similar to that of *Scapanorhynchus raphiodon*, the main distinctive features from the above described species being: 1) constantly smaller size and 2) character of striae. While the striae of *S. raphiodon* are prominent and almost parallel, those of the var. *tenuis* are less conspicuous, irregular and interrupted. The largest specimen of the Anterior tooth is 12 mm high.

*Scapanorhynchus tenuis* described by Davis from the Upper Cretaceous of Scandinavia, with regard to its description, as well as to its size, completely corresponds to the species just described from the cretaceous beds of Lithuania. I treat it as a variation of *S. raphiodon*.

OCCURRENCE. In all zones from Cenomanian up to Lower Campanian.

Genus **ODONTASPIS** Agassiz

**ODONTASPIS SUBULATA** Agassiz, 1843  
(Pl. III, figs. 77—83)

*Lamna (Odontaspis) subulata*. — L. Agassiz, 1843, vol. III, p. 206, pl. 37a, figs. 5—6.

*Lamna subulata*. — V. Kiprijanoff, 1854, p. 394, pl. III, figs. 39—45.

*Scapanorhynchus gracilis* (non Agassiz). — J. W. Davis, 1890, p. 386, pl. XXXVIII, figs. 18—20.

*Scapanorhynchus subulatus*. — A. S. Woodward, 1911, p. 212, pl. XLIV, figs. 18—21.

? *Scapanorhynchus subulatus*. — E. Stromer, 1927, p. 4, pl. I, figs. 21—22.

*Scapanorhynchus (?) subulatus*. — M. Leriche, 1929, p. 238.

*Scapanorhynchus subulatus*. — W. Weiler, 1930, p. 13, pl. III, figs. 9—12.

MATERIAL. Over fifty isolated teeth.

DESCRIPTION. The crown of the teeth is comparatively slender, with acuminate apex. Both faces of the crown are smooth; the prominence of the outer face of it is slight. The principle cones of the Anterior teeth show a sigmoidal curvature and are flanked with one pair of well developed acutely pointed denticles which on the Anterior teeth are separated from the principle cusps generally by well distinguishable grooves; these intervals are not perceived on the Lateral teeth of which the lateral denticles are broader. The base-line of the Lateral teeth is straight; this line is somewhat arched on the Anterior ones. The denticles of the

Anterior teeth are more or less divergent. There were found several „eye-teeth“ which undoubtedly belong to these species (fig. 78). Symphyseal teeth seem to be of two sizes. The root is prominent, with a median cleft for the foramen nutritive. The examined specimens of this species are not over 12 mm in height.

OCCURRENCE. All zones: from greenish black muds up to zone of *Actinocamax mammillatus*.

ODONTASPIS (SYNODONTASPIS) STRIATULA nov. sp.

MATERIAL. About a hundred isolated teeth.

DESCRIPTION. The crown of the Anterior teeth is slender, no longer than 10 mm in the present specimens. The shape of all the teeth in general is similar to that of *Odontaspis macrota striata*, from which it differs in being constantly of a smaller size and by having the denticles longer and both the faces of the crown covered with striae. The character of that striation on both sides is unlike; it is much coarser and shorter on the outer face than on the inner one, where these irregular striae attain in general to more than half the height of the crown. The short coarse striae at the base of the aboral face of the crown vary in their form, showing the tendency to become indistinct and less decided on the Anterior teeth; some such teeth are difficult to distinguish from the teeth of *Scapanorhynchus raphidon* var. *tenuis* described above. The denticles on the Anterior teeth are long and needle-sharp, while those on the Lateral teeth are minute, broad and on some specimens redoubled.

The crowns of the teeth have a slight prominence on the outer face, the margins in profile are straight, except those of the Anterior teeth which show a sigmoidal curvature. The small teeth with a flat inner face of the roots I assign to „eye-teeth“ (see E. I. White, 1931, p. 54). The presence of „eye-teeth“ and Symphyseal teeth of two different sizes (figs. 84, 86 ant 90), of which one is but little smaller than the Anterior teeth and the other very small, permit one to infer that the dentition of this species closely resembles that of the living *Odontaspis taurus* Rafinesque (type of Sub-genus *Synodontaspis* E. I. White).

The root is a little larger than in the small specimens of *O. macrota striata*; it is prominent on the inner face and has a sharp median groove.

It is possible that some broken small teeth with striae on both faces referred by Davis to *Oxyrhina conica* from the Upper Cretaceous of Scandinavia (J. W. Davis, 1890, p. 397, pl. XL, figs. 8—10), partly belong to this species.

There are about thirty teeth which differ from those just described because of the complete smoothness of the inner face of the crown. The lateral denticles of these specimens are somewhat smaller than those described above and have a tendency to a feathering on the Posterior lateral teeth. This property was not so distinctly observed on the specimens with striae on both faces. Since the general shape of these teeth is like that of *O. striatula*, I treat them as belonging to the same species.

OCCURRENCE. Common in the greenish dark muds of the Šventoji and Neris beds; Papiškiai; zones of *Actinocamax plenus* and *Rhynchonella octoplicata*: Veršvai, Skirsnemunė, Naukiemis.

ODONTASPIS MACRORHIZA Cope, 1875

(Pl. IV, figs. 96—101)

*Lamna macrorhiza*. — E. D. Cope, 1875, p. 297, pl. XLII, figs. 9—10.

*Odontaspis macrorhiza*. — M. Leriche, 1902, p. 109, pl. III, figs. 18—27.

*Odontaspis macrorhiza*. — M. Leriche, 1929, p. 239.

MATERIAL. Over fifty isolated teeth.

DESCRIPTION. All the teeth which were examined have common features: they are small, elevated but robust. The crown is seldom straight, generally curved, with a slight sigmoidal bend. The aboral coronal face is with a faint median longitudinal elevation; the oral face is very convex. The margins of the crown are very sharp. There is one pair of large, narrow, very sharp lateral denticles. Mostly the teeth are striated, but there is about 40 percent of them which are free of striae, or bear only a few faint folds at the base of the crown. The striae seem to be more constant on the outer face of the crown than on the inner one (see *O. macrorhiza* mut. *infracretacea* from Gault with the striae on the inner face: M. Leriche, 1910, p. 459): there were found only three specimens with the striae exclusively on the inner face.

The smooth teeth of the examined collection belong to the (upper?) Anterior teeth and to the upper Symphyseal ones; the small Symphyseal teeth have the outer face striated. Some teeth have extremely coarse striae on both faces of the crown. The presence of the Symphyseal teeth of two sizes enables to treat this species, as belonging to Sub-genus *Synodontaspis*.

The root is robust, with very prominent inner apex and a faint superficiel groove for the foramen nutritive.

OCCURRENCE. Somewhat rolled off teeth were found in the sands below the greenish dark muds of the Šventoji river; the greenish black muds of the Šventoji and Neris beds; zones of *Actinocamax plenus*, *Rhynchonella octoplicata* and *Actinocamax mammillatus*: Skirsnemunė, Veršvai.

**ODONTASPIS GIGAS** A. S. Woodward, 1889

(Pl. IV, figs. 102—108)

*Scapanorhynchus (?) gigas*. — A. S. Woodward, 1889, vol. I., p. 358.

*Scapanorhynchus ? (Odontaspis) gigas*. — M. Leriche, 1902, p. 109, pl. III, figs. 15—17.

*Odontaspis gigas*. — M. Leriche, 1929, p. 238.

MATERIAL. Seven detached teeth.

REMARKS. The teeth are robust, short, subulate and sharply pointed, the crown of the largest specimen of the Anterior tooth being 20 mm high. The external face is flat, the oral one is prominent; both are completely smooth. The cutting margins are very sharp from the apex up to their inferior limit. The crown is flanked by one pair of denticles which are very small, flattened and acuminate. There is no distinct groove on the inner side of the prominent root, and foramen nutritive opens directly on the inner apex. With regard to the robustness of the roots and very distinct sigmoidal curvature of the Anterior teeth, I refer these teeth to genus *Odontaspis*.

OCCURRENCE. Greenish black muds of the Šventoji and Neris beds; zones of *Actinocamax plenus* and *Rhynchonella octoplicata*: Veršvai, Skirsnemunė; doubtful records in the beds of *Actinocamax mammillatus*: Skirsnemunė.

**Genus Lamna Cuvier**  
(Syn. *Otodus* Agassiz)

**LAMNA APPENDICULATA** Agassiz, 1843  
(Pl. V, figs. 104—109)

*Otodus appendiculatus*. — J. W. Davis, 1890, p. 402,  
pl. XLI, figs. 1—11.

*Otodus obliquus*. — J. W. Davis, ibid., p. 407, pl. XLI,  
fig. 13.

*Odontaspis kopingensis*. — J. W. Davis, ibid., p. 390,  
pl. XXXVIII, figs. 27—28.

*Lamna appendiculata*. — A. S. Woodward, 1911, p.  
206, pl. XLIV, figs. 3—7; text-figs. 63—64.

*Lamna appendiculata*. — M. Leriche, 1929, p. 242.

MATERIAL. Sixty isolated teeth.

REMARKS. The teeth are robust and large; the aboral coronal face is slightly prominent, with few indefinite vertical folds in the lower half of some specimens; the oral face is convex and both faces are smooth. The cutting edges are very prominent. The lateral denticles — one pair in all — are broad but pointed. The root is very solid, with much flattened postero-inferior face. There is no groove for the foramen nutritive.

OCCURRENCE. Common in all zones.

**LAMNA cf. SEMIPLICATA** (Münster) Agassiz,  
(Pl. V, figs. 110—111)

MATERIAL. Fifteen isolated teeth.

DESCRIPTION. The teeth are robust. The outer face of the crown is slightly convex; its basal portion bears a series of irregular wrinkles of different length. The wrinkles (striae) of the inner face of the crown are longer, more delicate and have a tendency to disappear: there are some specimens with a quite smooth inner face. The lateral denticles are robust but acuminate, in some specimens incompletely subdivided. The root is very robust and prominent, while a slight groove for the foramen nutritive is to be seen only on well preserved specimens.

The described teeth bestly resemble those of *Lamna semipli-cata* Agassiz (A. S. Woodward, 1911, p. 208, pl. XLIV, figs. 10—11, as *L. semiplicata* and *ibid.*, p. 209, pl. XLIV, figs. 12—13, as *L. sulcata* Geinitz; M. Leriche, 1929, p. 249). But their size is smaller than that of the latter species: the largest up to the present collected tooth is only 10 mm high.

OCCURRENCE. The greenish black muds of the Šventoji and Neris beds; Turonian zone: Skirsnemunė, Veršvai.

**LAMNA cf. CRASSA** Agassiz  
(Pl. V, figs. 112—118)

There were found in the greenish dark muds of the Šventoji river some broken robust teeth which undoubtedly belong to a species, different from *Lamna appendiculata* Ag. The crown of these teeth is smooth, robust, short and curved, with the inner face of it very prominent. There is one pair of lateral comparatively narrow acuminate denticles. The rear margin of the crown is considerably curved. It is noteworthy that the transition of the margins of the crown into those of denticles is rounded. As the teeth are broken off, it is impossible to say whether the observed feature is really distinctive for all the found teeth or not.

For the shape of the crown these teeth somewhat resemble those of *Lamna crassa* Agassiz (1843, vol. III, p. 271, pl. 36, figs. 29—31).

**Genus Oxyrhina** Agassiz

**OXYRHINA (?) PRIMAEVA** nov. sp.  
(Pl. V, figs. 114—118)

MATERIAL. Fifteen well preserved isolated teeth.

DESCRIPTION. The teeth have a slender, elevated and smooth crown. The outer face of the crown is flat, while the inner one is gently rounded, so that all the crown is of a moderate thickness. The Anterior teeth are narrow, cuspidate, with the apex slightly inclined outwards. All the teeth, especially the Lateral ones, are inclined considerably backwards. Their crown expands at the base so, that the cutting enamel edges stretch over the upper portions of the branches of the root. There are no lateral denticles,

except the Posterior lateral teeth (?), which are much compressed, though comparatively narrow and very acute: they often have one undeveloped denticle (bead) on the hinder side of the crown (fig. 118). The root is abbreviated, the branches are very divergent; the root has a slight prominence on the oral side. There is no groove for the foramen nutritive on the apex of this prominence. There is on the outer face of the crown mostly an excavation (sinus) between the branches of the root.

The largest specimen is 15 mm high.

For the small size and decidedly expressed sloping backwards of the crown, these teeth are easily distinguished from those of *Oxyrhina mantelli* Agassiz (A. S. Woodward, 1911, p. 202, pl. XLIII, figs. 10—15; text-figs. 60—61; M. Leriche, 1902, p. 116, pl. III, figs. 49—53) and *Oxyrhina subbasalis* Kiprijanoff (1854, p. 390, pl. III, figs. 11—21) from Cenomanian of Russia and Western Europe. On the other hand the shape of the crown of the described teeth closely resembles that of *Corax*, so that our species can be treated, as a transitory one between *Oxyrhina* and *Corax* genera.

OCCURRENCE. Greenish black muds of the Šventoji and Neris rivers.

**OXYRHINA cf. ANGUSTIDENS** Reuss  
(Pl. V, figs. 119—120)

MATERIAL. About ten broken isolated teeth.

REMARKS. Among the collected teeth from the zones of *Actinocamax plenus*, *Rhynchonella octoplicata* and *Actinocamax westfalicus*, there are some which undoubtedly belong to genus *Oxyrhina*, most probably to *O. angustidens* Reuss (M. Leriche, 1902, p. 117, pl. III, figs. 59—65 and A. S. Woodward, 1911, p. 204, pl. XLIII, figs. 16—20). The crown of the teeth is thin, widening at the base into a short extension along the root, both in front and behind. There is no trace of lateral denticles. The margins are very thin and sharp.

Besides these teeth, several broken off, somewhat broader and larger ones, resembling those of *O. mantelli* Agassiz were found in the beds above the greenish black muds.

### III. THE STRATIGRAPHIC RESULTS OF THE STUDY OF THE FISH FAUNAS OF THE LITHUANIAN CHALK.

The Lithuanian Chalk has not been researched up to the last few years and was treated as a probably analogical one to the Chalk of East Prussia, the stratigraphy of which was based on the data of bore-holes and scanty records of Fauna of Mollusca (see Spulski, 1910). The Prussian geologists give such a scheme of subdivision of the Cretaceous sediments in the neighbourhood of Lithuania:

Upper Senonian (Maestrichtian and Upper Campanian); beds of *Belemnitella mucronata*.

Lower Senonian (Lower Campanian and Upper Santonian); beds of *Actinocamax mammillatus* and *Belemnitella mucronata*.

Emscher (Lower Santonian and Coniacian); beds of *Actinocamax verus* and *Inoceramus koeneni*.

Turonian, the most probably wanting.  
Cenomanian, supposed.

The Fauna of the Cenomanian of Prussia is known only from the boulders of Prussia (Noetling, 1895). Some Turonian boulders lately were also found there (Beurlen, 1931).

Much better researched are the Cretaceous sediments of the Gardinas (Grodno) area, where since long ago good exposures of chalk are known. The chalk of Gardinas pertains to Maestrich-

As it was told in the introduction to this communication, the geological researches have shown that the chalk layers of Lithuania mostly belong to Cenomanian and Turonian. Only scanty remains of Lower Senonian are to be seen in the exposures of the

Nemunas river. The stratigraphical subdivision of the Lithuanian Chalk was based upon the data of the invertebrate Faunas (see J. Da l i n k e v i č i u s, 1934). The inferences which suggest the fossil fishes, collected in these beds, are in full accordance with the data of Faunas of Mollusca.

The beds of *Actinocamax mammillatus*, *A. mammillatus bornholmensis* have furnished these fish remains:

- Acanthias appendiculatus* Leriche  
*Acanthias* sp.  
*Squatina* sp.  
*Cestracion* cf. *rugosus* Agassiz  
*Synechodus* sp.  
*Notidanus* sp.  
*Ptychodus latissimus* Agassiz  
*Ptychodus rugosus* Dixon  
*Corax* cf. *pristodontus* Agassiz *praem. kaupi* Agassiz  
*Corax* cf. *jaekeli* A. S. Woodward  
*Pseudocorax laevis* Leriche  
*Scapanorhynchus raphiodon* Agassiz  
*Scapanorhynchus raphiodon* Ag. var. *tenuis* Davis  
*Odontaspis subulata* Agassiz  
*Odontaspis macrorhiza* Cope  
? *Odontaspis gigas* A. S. Woodward  
*Lamna appendiculata* Agassiz

The most peculiar species of these beds are: *Odontaspis macrorhiza*, *Pseudocorax laevis*, *Ptychodus latissimus* and *P. rugosus*. After M. Leriche (1929, p. 214), the latter seems to be found only in the Coniacian and Santonian beds of the Cretaceous System of West Europe. The white and light gray chalky beds, in which this species was found in Lithuania, belong partly to the Lower Campanian, partly to Santonian and Coniacian which petrographically are difficult to distinguish. It must be still added that the upper beds of white and gray chalk of Lithuanian exposures are commonly displaced by the movement of the drift; they are very often intermixed or inserted in the other layers. Therefore some palaeontological records in the mentioned beds evidently can belong to different stratigraphical horizons.

The beds of *Actinocamax westfalicus* (Lower Coniacian) are characterised by these up to the lately found representatives of the fishes:

- Squatina* sp.  
*Synechodus* sp.  
*Corax falcatus* Agassiz  
*Scapanorhynchus raphiodon* Ag. var. *tenuis* Davis  
*Odontaspis subulata* Agassiz  
*Lamna appendiculata* Agassiz  
*Oxyrhina* cf. *angustidens* Reuss

The presence of *Corax falcatus*, so peculiar to Turonian beds, confirms the other palaeontological data, i. e. that these beds most probably pertain to Lower Coniacian.

Much more numerously is represented the ichthyic fauna of the beds of *Rhynchonella octoplicata*. The following species were found there:

- Acanthias appendiculatus* Leriche  
*Centrophorus* (?) *balticus* nov. sp.  
*Squatina* sp.  
*Synechodus nitidus* A. S. Woodward  
*Synechodus* sp.  
*Notidanus microdon* Agassiz  
*Notidanus* sp.  
*Ptychodus decurrens* Agassiz  
*Ptychodus mammillaris* Agassiz  
*Scapanorhynchus raphiodon* Agassiz  
*Scapanorhynchus raphiodon* Ag. var. *tenuis* Davis  
*Odontaspis subulata* Agassiz  
*Odontaspis striatula* nov. sp.  
*Odontaspis macrorhiza* Cope  
*Lamna appendiculata* Agassiz  
*Lamna* cf. *semiplicata* (Münster) Agassiz  
*Oxyrhina* cf. *angustidens* Reuss  
*Oxyrhina* cf. *mantelli* Agassiz

The presence of *Ptychodus mammillaris* and numerous typical *Corax falcatus* suggests that these beds belong to the horizons lower than Coniacian, where *C. falcatus* is found but rarely. *Ptychodus mammillaris* is also the most common in Turonian.

The zone of *Actinocamax plenus* contains many representatives of fishes:

- Acanthias appendiculatus* Leriche  
*Squatina decipiens* nov. sp.  
*Squatina* sp.  
*Scyllium antiquum* Agassiz  
*Scyllium* sp.  
*Ginglymostoma lithuanica* nov. sp.  
*Cestracion canaliculatus* Egerton  
*Acrodus giedroyci* nov. sp.  
*Synechodus nitidus* A. S. Woodward  
*Spinax major* Agassiz  
*Notidanus* sp.  
*Ptychodus decurrens* Agassiz  
*Ptychodus mammillaris* Agassiz  
*Corax falcatus* Agassiz  
*Scapanorhynchus raphiodon* Agassiz  
*Scapanorhynchus raphiodon* Ag. var. *tenuis* Davis  
*Odontaspis subulata* Agassiz  
*Odontaspis striatula* nov. sp.  
*Odontaspis macrorhiza* Cope  
*Odontaspis gigas* A. S. Woodward  
*Lamna appendiculata* Agassiz  
*Lamna* cf. *crassa* Agassiz  
*Oxyrhina* cf. *angustidens* Reuss  
*Oxyrhina* cf. *mantelli* Agassiz

The most characteristic for the mentioned beds is the presence of *Ptychodus mammillaris* and *Corax falcatus*, so common in the Cenomanian and Turonian strata of Western Europe. *Cestracion canaliculatus*, *Scyllium antiquum* and *Synechodus nitidus* are fossil fishes which occur in England in the middle cretaceous beds.

The greatest number of fossil fishes was found in the greenish black sandy muds of the Šventoji and Neris rivers and in Paškių on the Nemunas river. As it is said above, no other fauna, except the fossil fishes, was found there. Since the relation of these muds to the cretaceous and tertiary beds is unknown, the fossil fishes found there are of importance for the stratigraphical purposes. The following species were found in these muds:

- Acanthias appendiculatus* Leriche  
*Squatina decipiens* nov. sp.  
*Scyllium* sp.  
*Ginglymostoma lithuanica* nov. sp.  
*Ginglymostoma parvula* nov. sp.  
*Cestracion canaliculatus* Egerton  
*Cestracion upnikensis* nov. sp.  
*Acrodus giedroyci* nov. sp.  
*Hybodus (Polyacrodus) grewingki* nov. sp.  
*Synechodus nitidus* A. S. Woodward  
*Synechodus recurvus* Trautschold  
*Spinax major* Agassiz  
*Notidanus* sp.  
*Corax falcatus* Agassiz  
*Scapanorhynchus raphiodon* Ag. var. *tenuis* Davis  
*Odontaspis subulata* Agassiz  
*Odontaspis striatula* nov. sp.  
*Odontaspis macrorhiza* Cope  
*Odontaspis gigas* A. S. Woodward  
*Lamna appendiculata* Agassiz  
*Lamna cf. semiplicata* (Münster) Agassiz  
*Lamna cf. crassa* Agassiz  
*Oxyrhina (?) primaeva* nov. sp.

The following fish remains which are not yet described were found in the same beds:

- Ischyodus* sp.  
*Edaphodon* sp.  
*Elasmodectes* sp.  
*Gyrodus (?) cretaceus* Agassiz  
*Enchodus lewesiensis* Mantell  
? *Lophius* sp.  
? *Glyptorhynchus* sp.  
Teeth of Reptilia

The fish fauna of these muds shows a great affinity to that of the zone of *Actinocamax plenus*. The species named below are common in both these zones:

- Acanthias appendiculatus* Leriche  
*Squatina decipiens* nov. sp.  
*Ginglymostoma lithuanica* nov. sp.  
*Cestracion canaliculatus* Egerton  
*Acrodus giedroyci* nov. sp.  
*Synechodus nitidus* A. S. Woodward  
*Spinax major* Agassiz  
*Corax falcatus* Agassiz  
*Scapanorhynchus raphiodon* Ag. var. *tenuis* Davis  
*Odontaspis subulata* Agassiz  
*Odontaspis striatula* nov. sp.  
*Odontaspis macrorhiza* Cope  
*Odontaspis gigas* A. S. Woodward  
*Lamna appendiculata* Agassiz  
*Gyrodus (?) cretaceus* Agassiz  
*Enchodus lewesiensis* Mantell  
Teeth of Reptilia

The absence of the teeth of *Ptychodus* and rarity of *Corax* in the greenish black muds of the Šventoji and Neris rivers is noteworthy. Notwithstanding careful researches during four years, no tooth of that genus was found there. Not less remarkable is the affinity of the most abundant species of these beds to those recorded in the beds of the Lower Paleocene (tertiary species: *Acanthias minor* Daimerries, *Squatina prima* Winkler, *Synechodus (Scyllium errore) hauchecornei* Noetling, *Odontaspis macrota* Agassiz praem. *striata* Winkler etc.) and the abundance of many new species, unknown in the cretaceous beds of Western Europe. On the other hand, the presence of *Synechodus nitidus*, known in the English Gault and Cenomanian, *Synechodus recurvus*, *Odontaspis macrorhiza*, as well as lately found the middle cretaceous *Corax falcatus* (extremely rare!) in the researched greenish black muds speaks that here we have to deal with the fauna of the undoubtedly cretaceous age. Since no sandy muds and sands are known in the profile of the Cretaceous system of Lithuania and Prussia in the zones above Cenomanian, the beds spoken of evidently belong to the lower horizons of the cretaceous profile of Lithuania, i. e. they are older than the beds with *Actinocamax plenus*.

As the *Corax* and *Oxyrhina* are very rare in these muds, the *Ptychodus* is not yet found, one can infer that the probable age of these beds is very near, but not older than the time, when these genera made their appearance. As it is known, the earliest records of *Ptychodus* were made in the Vrannonian beds (M. Leriche, 1906, p. 55); the earliest irrefutable finds of *Corax* are referred also to the Lowest Cenomanian (E. Stromer, 1927, p. 6). Cenomanian is therefore the most suitable age for the greenish black sandy muds of the Šventoji and Neris rivers.

It must be acknowledged that *Oxyrhina* (?) *primaeva* nov. sp., found in the same greenish black muds, is one of the most remarkable palaeontological records in these beds. For the shape and other features *O. primaeva* can be treated, as a new transitory kind (genus?) between *Oxyrhina* and *Corax* genera.

Presumably to Gault are referable the light greenish sands with the intercalation of white and gray clay below the already mentioned black glauconitic muds. Very scanty remains of fishes were found in these sands: the broken crowns of *Synechodus* cf. *nitidus*, somewhat rolled off teeth of *Hybodus (Polyacrodus)* *grewingki*, *Odontaspis macrorhiza*, *Squatina* sp., teeth of Pycnodonts. The fossil contents of these sands does not contradict to an admission they are of Gault age.

The Upper Campanian and Lower Maestrichtian chalk is to be found in Lithuania only in bore holes, generally in the west of the Nemunas in the area of Suvalkija, where all the chalk formation is covered by thick glacial deposits. To Maestrichtian belongs the chalk of Gardinas. The ichthyic fauna of these beds is unknown.

#### IV. SUMMARY.

The fossil contents of some cretaceous beds of Lithuania is reduced exclusively to the fish remains. That is why the latter among all the Faunas are the first worked off and here preliminary described. Not all the cretaceous beds are equally researched. That explains why the greatest portion of the fossil fishes is collected in the greenish black muds generally poor in fauna and why so inconsiderable representatives of them are known from the white chalk.

The fossil fishes are represented entirely by isolated teeth, but the state of the preservation of the teeth, as well as their large number, allows the restoration of the dentitions of many species. Some of them are described here as new ones:

- Centrophorus* (?) *balticus* nov. sp.
- Squatina decipiens* nov. sp.
- Ginglymostoma lithuanica* nov. sp.
- Ginglymostoma parvula* nov. sp.
- Cestracion upnikensis* nov. sp.
- Acrodus giedroyci* nov. sp.
- Hybodus (Polyacrodus)* *grewingki* nov. sp.
- Odontaspis striatula* nov. sp.
- Oxyrhina* (?) *primaeva* nov. sp.

The following important inferences, based on the study of the cretaceous fish remains of Lithuania, can be made:

1. The appearance of *Acanthias* undoubtedly must be referred to the lower zone, as it was thought to be (*Acanthias latidens* Davis from Turonian of Mount Lebanon). The teeth of *Acanthias* in the explored Cenomanian beds of Lithuania make about 15 percent of all the fish fauna.

2. The *Acanthias* — like teeth of the upper and lower jaws, belonging most probably to the genus *Centrophorus* (*Centrophorus* (?) *balticus* nov. sp.) were found in the Turonian

beds and described here. For the rareness of fossil remains of Spinacidae from the middle cretaceous beds, these records in Lithuania are of great interest.

3. It is noteworthy that the teeth of *Squatina* are very numerous in the Cenomanian beds of Lithuania (*Squatina decipiens* nov. sp. as high as 15 percent of all the fauna). The want of material did not permit to author an exact comparison of different species of *Squatina* from the Cenomanian beds of England, Bohemia and Lithuania which may be identical.

4. The presence of the two different species of the *Ginglymostoma* (*Ginglymostoma lithuanica* nov. sp. and *Ginglymostoma parvula* nov. sp.) in the Cenomanian beds enables to widen the geological range of this genus, thus the lower limit referring probably to Cenomanian or even below, instead of the formerly indicated Senonian (*Ginglymostoma minutum* Forir).

5. Cestracionidae are numerously represented in the Cenomanian beds of Lithuania (12—15 percent of all the contents of the fauna). Three new species are described here: *Cestracion upnikensis* nov. sp., *Acrodus giedroyci* nov. sp. and *Hybodus* (*Polyacrodus*) *grewingki* nov. sp.

6. The researches had shown that *Scapanorhynchus raphiodon* in the cretaceous beds of Lithuania appears somewhat later than its probable predecessor var. *tenuis* Davis. This variation of *S. raphiodon* is very numerously represented in the Chalk of Scandinavia.

7. The undoubtedly discovery of the „eye - teeth“ enables to infer that *Scapanorhynchus* (?) *subulatus* Agassiz is *Odontaspis subulata* indeed.

8. A new small species of *Odontaspis* is described from the Cenomanian beds (*Odontaspis striatula* nov. sp.) which is probably one of the cretaceous ancestors of *Odontaspis macrota* Agassiz praem. *striata* Winkler of Paleocene.

9. *Oxyrhina* (?) *primaeva* nov. sp. is found only in the lowest layers of Cenomanian of Lithuania and is of great interest, as an intermediary species which has many distinctive features common with *Oxyrhina* and *Corax*. This new species seems to be confined to the beds not above Cenomanian and therefore can be of importance from the stratigraphical point of view.

## V. LIETUVOS KREIDOS ICHTIOFAUNA IR JOS STRATIGRAFINIS VAIDMUO.

Lietuvos kreidos tyrinėjimai atlikti per kelius paskutinius metus davė nemaža fosilinės medžiagos, kuri autoriaus buvo panaudota įvairių kreidos sistemos sluoksnų geologiniam amžiui nustatyti. Visos svarbesnės tuomet jo padarytos išvados buvo parentos moliuskų, ypač belemnitų fauna, kuri, kaip žinoma, yra viena iš svarbiausių ir charakteringiausiuų kreidos sistemai. Bet buvo surasti ir tokie sluoksniai, kuriuose neaptikta jokių moliuskų bei kitų bestuburių gyvūnų liekanų, o tik negausūs žuvų dantukai ir slanksteliai (vertebrai). Tokie sluoksniai juodai žalsvų dumblių pavidalu atsidengia Šventosios ir Neries upių krantuose ir Skirsnemunės rajone ties Papiškais. Kadangi šių dumblių padėtis kreidos sistemos sluoksnų atžvilgiu nėra aiški nei iš atodangų, nei iš grėžinių, tai surasta ichtiofauna pasirodė esanti vienintelė medžiaga, kuria buvo galima pasinaudoti sprendžiant šių dumblių stratigrafinę padėtį. Deja, kaip žinoma, Lietuvai artimiausią kaimyninių kraštų kreidų ir terciaro ichtiofauna paskutiniai laikais nebuvo tiriamas. Tik prieš kelias dešimtis metų ji buvo tyrinėta Čekijoje, Elbos slėnyje, Sambijoje ir Skandinavijoje, bet visi ten surinktų ichtiofaunu aprašymai dabar yra reikalingi stropių revizijų.

Autoriaus studijos ichtiofaunų kolekcijų Berlyno, Briuselio ir iš dalies Müncheno muziejuose įtikino, jog Lietuvoje surinkta fauna yra skirtinė ir nesiduoda visiškai tiksliai gretinama su faunomis, surinktomis tuose muziejuose iš franko - belgų kreidos ir terciaro baseinų, Mainco srityje ir kitų vietų. Pavyko tik konstatuoti, jog kalbamų dumblių amžius yra neabejotinai senesnis už vidurinį paleoceną. Tikslėsnius išvados buvo gautos tik vėliau, surinkus ichtiofauną iš įvairių Lietuvos kreidos sluoksnų. Su-rinktų faunu sulyginimas parodė, jog šie dumbliai yra senesni ir už kreidos sluoksnius su *Actinocamax plenus*.

Tokiu būdu buvo gautas šis Lietuvai charakteringas kreidos sistemos profilis:

**Viršutinis senonas** (mestrichtas — viršutinis kampanas) Balta kreida su titnagais; *Blemnittella mucronata Schloth.* (tik gręžiniuose ir Gardino atodangose);

**Apatinis senonas (H)** (apatinis kampanas — santonas) Balti ir pilki mergeliai; *Actinocamax mammillatus Nilss.*, *A. mammillatus Nilss. praem. bornholmensis Stolley*;

spėjama sedimentacijos pertrauka

**Emsėris** (apatinis konikas) Mergeliai su *Actinocamax westfalicus* Schlüter;

**Turonas** (F) Kreida su titnagais; *Rhynchonella octoplicata* Sow.

**Cenomanas** (C—D) (E) Žalsvai juodi mergelingi dumblai su *Actinocamax plenus Blv.*; Žalsvi mergelingi dumblai; Žalsvai juodi dumblai su ichtiofauna;

**Albas (goltas)** (A—B) Šviesiai žalsvi smėliai.

Dėliai žuvų liekanų, kaip stratigrafinės medžiagos, reikia padaryti šių pastabų.

Kaip žinoma, stratigrafiniam tikslams, t. y. sluoksnių amžiui nustatyti, ypatingai tinkamai tokie gyvūnijos atstovai, kurie pasižymėjo: 1) didžiausiu horizontaliniu ir 2) mažiausiu vertikaliniu išsiplėtimu žemės sluoksniuose. Vadinasi, tokie gyvūnai, kurie buvo labai plačiai pasaulyje paplitę ir todėl yra aptinkami jvairiuose kraštose; bet, išgyvenę palyginti trumpą geologinį laiką, jie beveik staičiai išnyko ir todėl yra surandami siaurose sluoksnių vertikalinių ribose. Tokiomis ypatybėmis pasižymi, pav., blemnittai kreidoje. Suprantama, kad žuvys, kaip geri plaukikai, pirmajam reikalavimui visiškai atitinka. Antra vertus, buvo irodyta, jog esama nemaža žuvų rūšių, kurių egzistavimo ribos buvo labai siauros. Nemažai privalumų turi jvykusi mesozoojuje ir ke-

nozojuje žuvų (pav., Selachii) diferenciacija. Tačiau yra žinomas faktas, kad ichtiofauna nėra plačiai vartojama stratigrafiniams tikslams, ir tai dėl sunkumų, surištu su jos apdirbimu. Vienintelis pav., Selachii, likučiai yra dantukai, slanksteliai, rečiau dorulitai, odos dygliai. Tačiau dantys, paimiti iš jvairių vietų apatinio arba viršutinio žando, yra labai skirtiniai, lygiai kaip esama žymiai skirtumų tarp dantų suaugusių ir jaunų individų, arba, kaip spėja Woodwardas, kartais tarp dantų vyriškos arba moteriškos lyties individų. Dar sunkiau nustatyti dorulitų, slankstelių ir kit. medžiaga. Vieninteliu mokslišku būdu selachijoms apdirbt dabar laikoma kiekvienos rūšies dantų komplekso restauracija. Pasirodė, kad, neatsižvelgiant į tiriamo dantuko padėti žuvies žande, lamnidų rūšies nustatymas iš pavienių radinių yra beveik neįmanomas. Tuo tenka aiškinti, kodėl dabartiniai paleoichtiologai kartais keliolika arba net ir didesnį kiekį jvairiaivardais aprašytų rūšių suveda krūvon ir pavadina vienu vardu (pav., *Oxyrhina hastalis*). Sąryš su šiais sunkumais ichtiofaunos apdirbimai dažniausia atsilieka nuo moliuskų, brachiopodų, koralų ir kitų fosilių aprašymų. Tačiau Lietuvoje kreidos ichtiofauna buvo anksčiau apdirbta už moliuskų fauną. Štai kodėl ji yra pirmiausia skelbiama.

Šiame darbe tėra aprašyta tik ichtiofaunos dalis, būtent, Selachii. Pažymėtiniai yra šie aprašytų rūšių stratigrafiniai savumai.

### Šeima Spinacidae

Gentis ACANTHIAS

*Acanthias appendiculatus* Leriche (teksto pav. 1—3, tab. I, pav. 1—4).

Lietuvoje surasta rūsis yra identiška rūšiai, Leriche'o aprašytajai iš Olandijos mestrichto (Limbourg), kaip *A. appendiculatus* Agassiz. Ši rūsis pas Agassiz'ą yra atvaizduota su dantuotomis briaunomis, ko nebuvę pastebėta nei lietuviškoje, nei olandiškoje medžiagoje. Lietuvoje cenomano sluoksniuose surasti *Acanthias* dantukai yra seniausi tos genties radiniai kreidoje, nes iki šioleli *Acanthias* liekanos buvo randamos ne žemiau turono sluoksnių.

Sluoksniai: C, D, E, F ir H.

Gentis CENTROPHORUS

*Centrophorus (?) balticus* nov. sp. (teksto pav. 4—7, tab. I, pav. 5—9).

Ši gentis nežinoma anglo-franko-belgų kreidos baseine, bet ji yra surasta Sirijos turone (Mount Lebanon). Cia aprašytoji rūšis yra pažymėtina, kaip labai reta, kuriai pavyko surasti ir viršutinius dantis. Sirijos kreidoje surasto *C. primaevus* Pictet et Campiche viršutiniai dantys visai nėra žinomi.

Sluoksniai: F.

Šeima Squatinidae

Gentis SQUATINA

*Squatina decipiens* nov. sp. (tab. I, pav. 10—17).

Rūšis artima dabartiniai *Squatina squatina* Linnaeus. Galimas daiktas, jog su laiku bus nustatyta, kad jvairiai vardais aprašyti dantys Squatina iš cenomano (*S. mülleri* Reuss, *S. cranei* A. S. Woodward ir kit.) tikrumoje priklauso mažesniams rūšių skaičiui.

Sluoksniai: C—D, E.

Šeima Scylliidae

Gentis SCYLLIUM

*Scylium antiquum* Agassiz (tab. I, pav. 18).

Rūšis, identiška aprašytajai iš anglų cenomano.

Sluoksniai: C.

*Scylium* sp.

Sluoksniai: C.

Šeima Orectolobidae

Gentis GINGLYMOSTOMA

*Ginglymostoma lithuanica* nov. sp. (tab. I, pav. 19—20).

Iki šiol Ginglymostoma tebuvo žinoma tik pradedant nuo viršutinės kreidos (*G. minutum* Forir iš mestrichto Vakarų Europos). Šios genties suradimas cenomano sluoksniuose Lietuvoje leidžia spręsti, jog ji yra egzistavusi dar vidurinės kreidos laikais.

Sluoksniai: C—D, E.

*Ginglymostoma parvula* nov. sp. (tab. I, pav. 21).

Sluoksniai: C—D.

Šeima Cestracionidae

Gentis CESTRACION

*Cestracion canaliculatus* Egerton (tab. I, pav. 22—28).

Rūšis identiška konstatuotai Anglijos cenomano sluoksniuose. Sluoksniai: C—D, E.

*Cestracion upnikensis* nov. sp. (tab. I, pav. 29—33).

Suradimas cenomane priešakinį Cestracion dantukų, skirtingu nuo *C. canaliculatus*, privertė autorių išskirti šią rūšį. *Cestracion upnikensis* korelacija su *C. rugosus* Ag., žinomu iš viršutinės kreidos, dėl davinų stokos, nėra pakankama išaiškinta.

Sluoksniai: C—D.

Gentis ACRODUS

*Acrodus giedroyci* nov. sp. (tab. I, pav. 34—35).

Ši mūsų cenomane rasta rūšis yra pavadinta vardu geologo A. Giedraičio, pasidarbuvisio Lietuvos kreidai pažinti\*).

Sluoksniai: C—D, E.

Gentis HYBODUS

*Hybodus (Polyacrodus) grewingki* nov. sp. (tab. I, pav. 36—38).

Rūšis gimininga *H. woodwardi* Dollo iš belgų kreidos, tačiau žymiai mažesnė; pavadinta vardu pirmutinio Lietuvos kreidos tyrinėtojo C. Grewingk'o.

Sluoksniai: A—B, C—D.

Gentis SYNECHODUS

*Synechodus nitidus* A. S. Woodward (tab. II, pav. 39—49).

Ši rūšis, gausiai randama Anglijos cenomane, yra konstatuota ir Lietuvoje cenomano ir turono sluoksniuose.

Sluoksniai: A—B, C—D, E, F.

*Synechodus recurvus* Trautschold (tab. II, pav. 50—58).

Ši rūšis, aprašyta iš Rusijos cenomano, yra žinoma ir Vakarų Europoje. Lietuvoje surinkta gausi šiai rūšiai priklausanti medžiaga rodo, jog ir kitais vardais aprašyti kreidos synechodai

\*) Geologas kunigaikštis A. Giedraitis savo pavardę rašydavo Giedroyć; šiuo vardu jis yra žinomas geologinėje literatūroje.

(pav., *S. nerviensis* Leriche, *Odontaspis acutissima* Davis) veikiausia priklauso šiai rūšiai.

Sluoksniai: C—D.

*Spinax major* Agassiz (tab. II, pav. 59).

Šis dorulitas greičiausia priklauso synechodui, todėl jis prie šios genties ir priskirtas.

Sluoksniai: C—D, E.

#### Šeima Notidanidae

Gentis NOTIDANUS

*Notidanus microdon* Agassiz (tab. III, pav. 60).

Rūšis plačiai sutinkama ir viršutinėje ir vidurinėje kreidoje.

Sluoksniai: F.

#### Šeima Ptychodontidae

Gentis PTYCHODUS

*Ptychodus decurrens* Agassiz.

Rūšis surandama nuo cenomano iki mestrichto pabaigos.

Sluoksniai: E, F.

*Ptychodus latissimus* Agassiz (tab. III, pav. 61).

Rūšis charakteringa turono ir apatinio senono sluoksniams; taip pat žinoma ir iš Rytprūsių apatinio senono.

Sluoksniai: H.

*Ptychodus mammillaris* Agassiz (tab. III, pav. 62).

Rūšis ypatingai charakteringa apatiniam turonui.

Sluoksniai: E, F.

*Ptychodus rugosus* Dixon.

Charakteringas apatiniam senonui (koniakui ir santonui).

Sluoksniai: G—H.

#### Šeima Lamnidae

Gentis CORAX

*Corax falcatus* Agassiz (tab. III, pav. 63—67).

Rūšis labai būdinga vidurinei kreidai (cenomanui ir turonui).

Sluoksniai: C, E, F, G.

*Corax cf. pristodontus* Agassiz praem.. *kaupi* Agassiz.

Rūšis *Corax pristodontus kaupi* ypatingai charakteringa apatiniam senonui. Lietuvoje surasti dantukai yra aplaužyti ir todėl nesiduoda tiksliai identifikuojami su sakyta rūšimi.

Sluoksniai: H.

*Corax aff. jaekeli* A. S. Woodward (tab. III, pav. 68).

Lietuvoje surasti dantukai yra kiek skirtinių nuo tipingų *C. jaekeli*, tačiau jų giminingumas yra neabejotinas. Ir vieni ir kiti yra kilę iš viršutinės kreidos.

Sluoksniai: H.

Gentis PSEUDOCORAX

*Pseudocorax laevis* Leriche (tab. III, pav. 69).

Rūšis atsiradusi viršutiniame turone, tačiau ypatingai būdinga apatiniam senonui.

Sluoksniai: H.

Gentis SCAPANORHYNCHUS

*Scapanorhynchus raphiodon* Agassiz (tab. III, pav. 70—71).

Charakteringas kreidai, pradedant nuo cenomano iki mestrichto pabaigos.

Sluoksniai: E, F, H.

*Scapanorhynchus raphiodon* Agassiz var. *tenuis* Davis (tab. III, pav. 72—75).

Davis'as yra aprašęs iš kreidos Skandinavijos *Scapanorhynchus tenuis*, kuris yra panašus *S. raphiodon*, bet skiriasi savo mažesniu dydžiu ir raukšlėtumo pobūdžiu. Šiame darbe *S. tenuis* yra traktuojama, kaip variacija *S. raphiodon*.

Sluoksniai: C—D, E, F, G—H.

Gentis ODONTASPIS

*Odontaspis subulata* Agassiz (tab. III, pav. 77—83).

Iki šiol nebuvvo aišku, ar *Scapanorhynchus* (?) *subulatus* Ag. priklauso *Scapanorhynchus* ar *Odontaspis* genčiai.. Autoriui pavyko surasti neabejotinai šiai rūšiai priklausantieji „akies dantukus“ ir tuo būdu išspręsti šią jau senai kilusią abejonę. Rūšis dažnai aptinkama vidurinės ir viršutinės kreidos ir apatinio paleoceno sluoksniuose. Šiai rūšiai tenka priskirti *Scapanorhynchus gracilis* Davis, dažnai aptinkamas Skandinavijos kreidoje.

Sluoksniai: C—D, E, F, G—H.

*Odontaspis striatula* nov. sp. (tab. IV, pav. 84—95).

Ši nauja rūšis veikiausia sudaro vieną iš premutacijų *Odontaspis macrota* Ag., kuri yra žinoma apatiniaiame terciare. Kadangi buvo konstatuoti „akies“ dantukai ir dviejų tipų simfiziniai dantys, tai aprašomos rūšies dantuotumas buvo restauruotas pagal daibartinį *Odontaspis taurus* Rafinesque.

Sluoksniai: C—D, E, F.

*Odontaspis macrorhiza* Cope (tab. IV, pav. 96—101).

Rūšis būdinga vidurinei kreidai ir apatiniam senonui.

Sluoksniai: A—B (?), C—D, E, F, H.

*Odontaspis gigas* A. S. Woodward (tab. IV, pav. 102—103).

Rūšis aptinkama kiek siauresnėse stratigrafinėse ribose, kaip *O. macrorhiza* (cenomanas — santonas).

Sluoksniai: C—D, E.

Gentis LAMNA

*Lamna appendiculata* Agassiz (tab. V, pav. 104—109).

Tai yra viena iš rūsių gausiai sutinkamų kreidoje ir apatiniaiame terciare (paleocene).

Sluoksniai: C—D, E, F, G—H.

*Lamna cf. semiplicata* Agassiz (tab. V, pav. 110—111).

*Lamna semiplicata* yra charakteringa vidurinei kreidai ir apatiniam viršutinės kreidos horizontams.

Sluoksniai: C—D, F.

*Lamna cf. crassa* Agassiz (tab. V, 112—113).

Rūšis sutinkama ir vidurinėje ir viršutinėje kreidoje.

Sluoksniai: C—D.

Gentis OXYRHINA

*Oxyrhina (?) primaeva* nov. sp. (tab. V, 114—118).

Rūšis skirtinges išvaizdos nuo kitų vidurinės kreidos oksirinų. Tuo tarpu aptikta apatiniuose Lietuvos cenomano sluoksniuose.

Sluoksniai: C.

*Oxyrhina cf. angustidens* Reuss (tab. V, pav. 119—120).

*O. angustidens* yra tipinga vidurinei kreidai ir apatiniam senonui.

Sluoksniai: E, F, G.

### Ichtiofauna įvairių Lietuvos kreidos sluoksninių.

List of fish Faunas of the various beds of the Lithuanian Chalk.

Šviesiai žalsvi smėlai. — Sands	Žalsvai juodi dumblai.—Greenish black muds	Sluoksniai su <i>Acanthias plenus</i>	Sluoksniai su <i>Rhynchonella octoplicata</i>	Sluoksniai su <i>Actinocamax westfalicus</i> ir <i>A. mammillatus</i>
A—B	C—D	E	F	G—H
<i>Acanthias appendiculatus</i> Leriche sp.	.	+	+	+
<i>Centrophorus (?) balticus</i> nov. sp.	.	.	.	•
<i>Squatina decipiens</i> nov. sp. spsp.	+	+	+	+
<i>Scyllium antiquum</i> Ag. spsp.	.	+	+	+
<i>Ginglymostoma lithuanica</i> nov. sp.	.	+	+	+
<i>Ginglymostoma parvula</i> nov. sp.	.	+	+	
<i>Cestracion canaliculatus</i> Egerton „ <i>upnikensis</i> nov. sp. cf. <i>rugosus</i> Ag.	.	+	+	+
<i>Acrodus giedroyci</i> nov. sp.	.	+	+	
<i>Hyodus (Polyacrodus) grewing- ki</i> nov. sp.	+	+		+
<i>Synechodus nitidus</i> A. S. Wood- ward	+	+	+	+
<i>Synechodus recurvus</i> Trautschold spsp.	+	+	+	+
<i>Spinax major</i> Agassiz	.	•	•	+
<i>Notidanus microdon</i> Ag. spsp.	•	•	•	+
<i>Ptychodus decurrens</i> Ag. „ <i>latissimus</i> Ag. „ <i>mammillaris</i> Ag. „ <i>rugosus</i> Dixon	•	•	•	+
<i>Corax falcatus</i> Ag.	•	•	•	+
<i>Corax cf. pristodontus</i> Ag. <i>praem.</i> <i>kaupi</i> Ag.	•	•	•	+

	Šviesiai žalsvai smėliai.—Sands	Žalsvai juodi dumblaučiai — Greenish black muds	Sluoksniai su <i>Actinonamax plenus</i>	Sluoksniai su <i>Rhynchonella octoplicata</i>	Sluoksniai su <i>Actinonamax westfalicus</i> ir <i>A. mammillatus</i>
A—B	C—D	E	F	G—H	
<i>Corax</i> aff. <i>jaekeli</i> A. S. Woodward	.	.	.	.	+
<i>Pseudocorax laevis</i> Leriche	.	.	+	+	+
<i>Scapanorhynchus raphiodon</i> Ag.	.	.	+	+	+
<i>Scapanorhynchus raphiodon</i> var. <i>tenuis</i> Davis	.	+	+	+	+
<i>Odontaspis subulata</i> Ag.	.	+	+	+	+
" <i>striatula</i> nov. sp.	.	+	+	+	+
" <i>macrorhiza</i> Cope	+	+	+	+	+
<i>Odontaspis gigas</i> A. S. Woodward	.	+	+	+	?
<i>Lamna appendiculata</i> Ag.	.	+	+	+	+
<i>Lamna</i> cf. <i>semiplicata</i> (Münster) Ag.	.	+	+	+	+
<i>Lamna</i> cf. <i>crassa</i> Ag.	.	+	+	+	+
<i>Oxyrhina</i> (?) <i>primaeva</i> nov. sp.	.	+	+	+	+
" <i>angustidens</i> Reuss	.	.	+	+	+
" <i>mantelli</i> Ag.	.	.	+	+	+
—	—	—	—	—	—
<i>Ischyodus</i> sp.	.	++	+		
<i>Edaphodon</i> spp.	.	+++	+		
<i>Elasmodectes</i> sp.	.	++	+		
<i>Gyrodus</i> (?) <i>cretaceus</i> Ag.	.	++	+		
<i>Pycnodonti</i> gent. inc.	+	++	+		
<i>Enchodus lewisiensis</i> Mantell	.	++	+		
cf. <i>Glyptorhynchus</i> sp.	.	++	+		
cf. <i>Lophius</i> sp.	.	++	+		
<i>Teleostei</i> gent. inc.	.	++	+		
<i>Réptilia</i> (dantys)	.	++	+		
<i>Vertebrai</i>	.	++	+		
<i>Koprilitai</i>	.	++	+	+	

Šiame darbe yra aprašyti šios naujos rūšys, aptiktos žalsvai juoduose Šventosios ir Neries dumbluose, bet daugumoje surastos ir kituose vidurinės kreidos sluoksniuose:

- Squatina decipiens* nov. sp.
- Ginglymostoma lithuanica* nov. sp.
- Ginglymostoma parvula* nov. sp.
- Cestracion upnikensis* nov. sp.
- Acrodus giedroyci* nov. sp.
- Hybodus (Polyacrodus) grewingki* nov. sp.
- Odontaspis striatula* nov. sp.
- Oxyrhina* (?) *primaeva* nov. sp.

Viena nauja rūšis buvo konstatuota tik turono sluoksniuose su *Rhynchonella octoplicata* Sow.:

- Centrophorus* (?) *balticus* nov. sp.

Visos kitos (virš 25) čia aprašytosios rūšys yra žinomos Vakarų Europos ir Rusijos kreidoje ir paleoceno apatiniuose sluoksniuose.

Žalsvai juoduose dumbluose surinkta medžiaga štai ką parodė.

Visų pirmą buvo nustatyta, kad nors ir įvairios žuvų subklasės buvo rinkiny konstatuotos, tačiau pilniausiai ir gausingiausiai yra atstovaujančios elasmobranchijos, ypač selachijos. Todėl selachijos ir buvo pirmo eilėje apdirbtos.

Iš selachijų sutinkame 7 šeimias: *Spinacidae*, *Squatiniidae*, *Scylliidae*, *Orectolobidae*, *Cestracionidae*, *Notidanidae* ir *Lamnidae* su 13 genčių, kurioms priklauso virš 25 atskirų rūšių. Gausingiausiai atstovaujančios yra šios gentys:

<i>Acanthias</i>	15—20%
<i>Squatina</i>	15—20,,
<i>Synechodus</i>	10—15,,
<i>Odontaspis</i>	20,,
visos kitos elasmobranchijos ir holocefalai	20,,
<i>Teleostei</i>	20,,

Neturime pamiršti, kad šie dumblai gali būt arba jaunesni, arba senesni už baltąją kreidą, kuri klojosi nuo turono pradžios

iki kreidos sistemos pačios pabaigos. Vadinas, žalsvai juodi dumblai gali priklausyti arba apatiniams terciaro sluoksniams, arba yra senesnio amžiaus už turoną.

Jeigu mes pažvelgsime į atskirų genčių ir rūšių stratigrafinio išsiplėtimo ribas, tai galėsime prieiti prie tokių išvadų.

Štai faktai, kurie kalba paleoceno naujai:

1. *Acanthias*, nors ir žinomas nuo turono pabaigos, tačiau didesniame kieky sutinkamas tik nuo viršutinio senono (mestrichto).

2. *Squatina*, nors ir atsiradusi juros sistemoje, didesnio išsiplėtimo pasiekė tik terciare. Kreidos sistemos skvatinos, žinomas iš cenomano ir santono (*S. cranei* Woodw., *S. mülleri*, *S. hassei* Leriche) yra, palyginti, labai retos ir nustatytos tik iš pavienių dantukų. Lietuvoje surasti skvatinos dantukai visai mažai tesiskiria nuo *S. prima* Winkler iš Belgijos paleoceno.

3. *Gingymostoma* buvo iki šiol žinoma pradedant tik nuo pačių kreidos sistemos viršinių (mestrichto). Šventosios žalsvai juoduose dumbluose buvo surastos net dvi atskirojos rūšys.

4. *Glyptorhynchus* buvo iki šiol žinomas tik pradedant eocenu.

5. *Xiphodolamia* ir *Lophius* taip pat yra žinomi tik terciario sluoksniuose.

Tačiau, jeigu priskaitytumėm Šventosios žalsvai juodus dumblus prie apatinio terciaro (paleoceno), tai turėtumėm laikytis, kad sekančios gentys išmirė žymiai vėliau, kaip buvo iki šiol manyma, gentys, kurios irgi buvo konstatuotos tuose pačiuose Šventosios dumbluose:

1. *Acrodus* ir *Polyacrodus*; tuo tarpu jie žinomi sluoksniuose, neaukščiau santono, t. y., apatinio senono;

2. *Odontaspis macrorhiza*; ši lengvai nustatoma rūšis yra žinoma iš horizontų, neaukščiau kampano;

3. *Lamna semiplicata*; tuo tarpu ji buvo surandama kreidos sluoksniuose, neaukščiau santono;

4. *Enchodus* taip pat yra laikomas neginčytinai išmirusių kreidos sistemos pabaigoje;

5. *Gyrodus* nebuvę surandamas aukščiau turono sluoksniu.

Dabar pažvelkime, kokias išvadas turėsime padaryti, jeigu prileisime, jog sakytieji Šventosios ir Neries dumblai yra senesnio amžiaus už turoną.

Už priskiriamą dumblų vidurinei kreidai, kaip matėme, kalba šios gentys ir rūšys:

1. *Acrodus* ir *Polyacrodus*, randami neaukščiau santono;

2. *Gausūs synechodai*; ši gentis yra ypač charakteringa vidurinei kreidai.

3. *Odontaspis macrorhiza*, surandamas neaukščiau kampano; iš dalies *O. gigas*, kurs taipogi aptinkamas tik kreidos sistemoje;

4. *Lamna semiplicata*, charakteringa vidurinei kreidai ir apatiniams viršutinės kreidos horizontams;

5. *Gyrodus cretaceus* ir *Enchodus lewesiensis*, žinomi tik vidurinėje kreidoje.

Tuomet turėsime prileisti, kad žemiau nurodytos gentys yra atsiradusios žymiau anksčiau, kaip buvo iki šiol laikoma:

1. *Acanthias* jau cenomano amžiuje yra atstovaujanamas rūšimi, beveik nesiskiriančia, nuo paleoceninės *A. minor*.

2. *Squatina* jau vidurinės kreidos laikais buvo labai paplitusi gentis; cenomane ji yra atstovaujama rūšies, beveik identiškos dabartinei *S. angelus*.

3. *Gingymostoma*, kuri nebuvę žinoma žemiau mestrichto, tektų laikyti atsiradusią dar vidurinės kreidos laikais, o gal net ir dar anksčiau.

4. *Glyptorhynchus* ir *Lophius* iki šiol kreidoje visai nebuvę žinomi.

Kaip matome, ir viena ir kita žalsvų dumblų amžiaus interpretacija reikalauja kaikurių pakeitimų ligšolinių pažiūrų į kai-kurių genčių atsiradimo arba išnykimo geologinius momentus.

Kad tiksliau nustatyti šių dumblų amžių, teko gretinti juose surinktą ichtiofauną su ichtiofauna įvairių Lietuvos kreidos sistemos sluoksniių. Pasirodė, kad cenomano-turono sluoksniai su *Actinocamax plenus* fosiliinių žuvų atžvilgiu yra artimiausi žalsvai juodiems Šventosios ir Neries dumblams. Skirtumas yra tame, jog sluoksniuose su *Actinocamax plenus* yra gausūs *Ptychodus* ir *Corax* dantys, tuo tarpu, kaip žalsvai juoduose dumbluose tik pačiu paskutiniu momentu pavyko surasti dantys *Corax falcatus*. Reikia pažymėti, jog *Corax* ir *Ptychodus* yra laikomi vi-

durinės ir viršutinės kreidos leitfossilijomis. Gausingais šių genčių tyrinėjimais buvo nustatyta, jog abi šios gentys atsirado padioje cenomano pradžioje ir išnyko viršutinės kreidos pabaigoje. Tat *Corax falcatus*, kaip vidurinės kreidos leitfossilijos suradimo faktą reikia laikyti labai svarbiu įvykiu, galutinai nulemiančiu šių dumblų amžių. Tas faktas, kad šiuose dumbluose *Corax* yra surandamas nepaprastai retai (tarp keliolikos tūkstančių sulaužytų ir sveikų dantukų surasti vos 2—3 egzemplioriai, kurie tinka apibūdintiniui), o *Ptychodus* ir visai iki šiol lieka dar nesurastas, tam tikru laipsniu liudyja, kad šie dumblai yra susikloję dar tais geologiniais laikais, kuomet šios fosilijos buvo nepaprastai retos, atseit apatinio cenomano, vad., vrakono laikais. Vadinas, esamais daviniais vrakonas yra patikimiausias šių dumblų sedimentacijos amžius.

Reikia pastebeti, kad Lietuvos žalsvai juodų dumblų ichiofaunos studijos leido ne tik tai, kaip anksčiau buvo nurodyta, nustatyti, kad kelios gentys, kaip *Acantias*, *Ginglymostoma*, *Glyptorhynchus* ir *Lophius* yra atsiradusios žymiai anksčiau, kaip buvo manyta, bet išspresti visą eilę ir kitų ichtiologijai svarbių klausimų. Pav., pavyko išspresti ginčą, besitęsusį keliasdešimt metų, kokiai, būtent, genčiai priklauso rūšis, vad. *Scapanorhynchus (?) subulatus* Ag. Lietuviškoje medžiagoje pavyko surasti vad. „akies“ dantukus („eye-teeth“, dents intermediaires), kurie visą ginčą nulemia *Odontaspis* naudai. Ir bendrai pasirodė, kad *Scapanorhynchus* vaidina ne tokį žymų vaidmenį kreidos sistemos faunoj, kaip buvo sprendžiama iš franko-belgų kreidos baseino radinių: Lietuvos cenomane yra surastos net keturi os *Odontaspis* rūsys, ir tik viena *Scapanorhynchus*.

Autoriaus yra surasta ir aprašyta nauja įdomi rūsis — *Odontaspis striatula*, — kuri veikiausia sudaro premutaciją *O. macrota striata*, sutinkamą apatiniam terciare. Taip pat čia aprašyta nauja rūsis, užimanti tarpinę padėtį tarp *Oxyrhina* ir *Corax* genčių, taip kad nei vienos šių dviejų genčių požymiai negalejo būt pritaikinti Lietuvoje surastai rūšiai. Šventosios žalsvai juodų dumblų apatinuose horizontuose tikra oksirina tuo tarpu nesurasta, o korakso randami tik pėdsakai. Kadangi grynos *Oxyrhina* ir *Corax* gentys laikomos atsiradusiomis vidurinėje kreidoje, tai iš šią lietuviškąją rūšį, šiame darbe pavadintą *Oxy-*

*rhina* (?), *primaeva* nov. sp., galima žiūrėti, kaip i naujos genties atstovę, genties, iš kurių diferenciacijos, keliu, išsvystė. *Oxyrhina* ir *Corax*. Ši rūsis jau nebesutinkama aukštessniuose horizontuose Lietuvos kreidos sistemoje. Žinoma, galima surasti išeitį ir neišskiriant naujos genties. Tuomet tektų praplėsti vienos iš dviejų nurodytų genčių morfologinius požymius taip, kad vienos arba kitos genties riboje tilpty visi nauji lietuviškosios rūšies požymiai.

Šios rūšies aptikimą autorius laiko savo ichtiologinių tyrinėjimų svarbiausiu rezultatu.

Įdomu, kad žalsvai juodų dumblų apačioje klostosi šviesiai žalsvi smėliai su devono, juros ir vidurinės kreidos apzulinta žuvų fauna; jų tarpe visai nėra *Ptychodus* ir *Corax* dantukų. Patys smėliai yra labai tipingi, kaip vidurinės kreidos transgreduojančios jūros priekrantinės nuosėdos; jų amžius — veikiausia albas. Vidurinės kreidos tyrinėjimai Lenkijoje taip pat parodė, kad apatinio cenomano padermės klostosi virš žalsvų smėlių ir juodų molių neabejotino albo kilmės. Ir Lietuvoje šviesiai žalsvų smėlių tarpe pasitaiko tarpusluoksnį juodų molių. Dar 1925 metais lenkų geologas S a m s o n o w i c z i u s rašė, kad Prūsijoje ir Lietuvoje, jo manymu, gali būti ir cenomanas ir albas. Tokiu būdu šis jo prileidimas pasirodė visai teisingas, nes autorui pavyko ir cenomaną ir iš dalies albą Lietuvoje nustatyti, remiantis paleontologiniais daviniais.

Svarbu pažymėti visišką sutapimą stratigrafinio Lietuvos kreidos suskirstymo, atlikto pasiremiant moliuskų fauna iš vienos pusės ir ichtiofaunos pagalba — iš kitos. Ichiofaunos pobūdis dar stipriau pabrėžia cenomano ir turono atodangų išsiplėtimą Lietuvoje, kurs buvo nustatytas ir iš moliuskų faunos. Faunos aprašyme, kaip matėme, senono fauna atstovaujama labai negausiai, nes apatinio senono atodangų turime nedaug.

Lietuvos viršutinio senono ichtiofauna tuo tarpu visai nėra žinoma, nes jo sluoksniai, išskyrus Gardino rajoną, pas mus dar nesurasti žemės paviršiuje.

Darbo pabaigoje laikau savo malonia pareiga išreikšti gilią padėką V. D. Universiteto Matematikos - Gamtos Fakultetui, leidusiam man išvykti į Vokietiją ir Belgiją susipažinti su ichtiofaunos tyrinėjimo metodais ir rinkiniais, o taip pat ir Mineralogijos ir Geologijos Katedros Vedėjui prof. M. Kaveckui, sutikusiam

Kabineto lėšomis apmokėti kai kurias su šiuo mano darbu surištas išlaidas ir malonai leidusiam tarnybos metu apdirbinėti šią fauną.

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#### EXPLANATION OF PLATES I—V.

The specimens figured on these plates are preserved in the Museum of the Natural History of the University in Kaunas.

Almost all the figured specimens are enlarged, as indicated below.

#### Plate I.

- 1—4. *Acanthias appendiculatus* Leriche. — Greenish black muds of the Šventoji and Neris rivers.
1. Upper anterior tooth: a. front view, x3; c. inner view, nat. size; 1\*. Ditto: a. front view, x2.

2. Anterior tooth: a. front view, nat. size and x3; c. inner view, x3.
3. Lateral tooth: a. front view, x2; c. inner view, x3.
4. Posterior lateral tooth: a. front view, x3.
- 5—9. *Centrophorus (?) balticus* nov. sp. — Chalk with *Rhynchonella octoplicata* (Skirsnemuné).
5. Upper right anterior tooth: a. front view, x3.
6. Upper right lateral tooth: a. front view, x3; c. inner view x3.
7. Lower anterior tooth: a. front view, x3; c. inner view, x3.
8. Lower lateral tooth: a. front view, x3.
9. Lower posterior lateral tooth: a. front view, x3.
- 10—17. *Squatina decipiens* nov. sp. — Greenish black muds of the Šventoji and Neris rivers.
10. Upper anterior tooth: a. front view, x2; d. basilar view, x2.
11. Upper right lateral tooth: a. front view, x2; d. basilar view, x2.
12. Upper lateral tooth: a. front view, x2.
13. Upper posterior lateral tooth: a. front view, x3.
14. Lower anterior tooth: a. front tooth, x2; b. side view, x2.
15. Lower right anterior lateral tooth: a. front view, nat. size and x2; b. side view, x2; d. basilar view, nat. size.
16. Lower right lateral tooth: a. front view, x2.
17. Lower posterior lateral tooth: a. front view, x2.
18. *Scylium antiquum* Agassiz. — Zone of *Actinocamax plenus* (Skirsnemuné, Naukiemis). — a. front view, x3; c. inner view, x3.
- 19—20. *Ginglymostoma lithuanica* nov. sp. — Greenish black muds of the Šventoji river.
19. Lateral tooth: a. front view, nat. size and x3; b. side view, x2.
20. Posterior lateral tooth: a. front view, x3.
21. *Ginglymostoma parvula* nov. sp. — Greenish black muds of the Šventoji river. — a. front view, x3; d. basilar view, x3.
- 22—28. *Cestracion canaliculatus* Egerton. — Greenish black muds of the Šventoji and Neris beds.
22. Anterior tooth: a. front view, x3; c. inner view, x3.
23. Anterior tooth (zone of *Actinocamax plenus*): a. front view x3.
24. Lateral tooth: d. basilar view, x2; e. upper surface, x2.
25. Lateral tooth: b. side view, x2; e. upper surface, x2.
26. Lateral tooth: e. upper surface, nat. size and x2.
27. Lateral tooth: e. upper surface, x2.
28. Posterior lateral tooth: e. upper surface, x3.
- 29—33. *Cestracion upnikensis*, nov. sp. — Greenish black muds of the Šventoji river.

29. Anterior tooth: a. front view, x3; b. side view, x3; c. inner view, x3; d. basilar view, x2.
30. Anterior tooth: a. front view, x3; c. inner view, x2.
31. Lateral tooth: b. side view, x3; e. upper surface, x3.
32. Lateral tooth: e. upper surface, x3.
33. Posterior lateral tooth: e. upper surface, x3.
- 34—35. *Acrodus giedroyci* nov. sp..
34. Anterior lateral tooth (zone of greenish black muds): b. side view, x3; e. upper surface, nat. size and x3.
35. Lateral tooth (zone of *Actinocamax plenus*): e. upper surface, x3.
- 36—38. *Hyodus (Polyacrodus) grewingki* nov. sp.. — Greenish black muds of the Šventoji river.
36. Lateral tooth: b. side view, x3; e. upper surface, x2.
37. Lateral tooth: b. side view, nat. size and x3; e. upper surface, x2.
38. Posterior lateral tooth: b. side view, x3.

Plate II.

- 39—49. *Synechodus nitidus* A. S. Woodward. — Greenish black muds of the Šventoji river.
39. Anterior tooth: a. front view, x2; b. side view, x2.
40. Anterior tooth: a. front view, x3.
41. Anterior tooth: a. front view, nat. size and x2; b. side view, nat. size; c. inner view, x2; d. basilar view, nat size.
42. Anterior lateral tooth: a. front view, x3.
43. Lateral tooth: a. front view, x2; e. tooth upright, x2.
44. Lateral tooth: a. front view, x3.
45. Lateral tooth: a. front view, x3.
46. Lateral tooth: a. front view, x3.
47. Lateral tooth: a. front view, x3.
48. Posterior lateral tooth: a. front view, x3.
49. Posterior lateral tooth: a. front view, x3.
- 50—58. *Synechodus recurvus* Trautschold. — Greenish black muds of the Šventoji river.
50. Anterior tooth (outer face smooth): a. front view, x2.
51. Anterior tooth (outer face striated): a. front face, nat. size and x2; e. tooth upright, x2.
52. Anterior (?) tooth: a. front view, x2.
53. Lower (?) lateral tooth: a. front view, nat. size and x2; c. inner view, x2.
54. Lower (?) lateral tooth: a. front view, x2; b. side view, x2.
55. Posterior lateral tooth: a. front view, x3.
56. Upper (?) anterior lateral tooth: a. front view, x2.
57. Upper (?) lateral tooth: a. front view, x2; b. side view, x2; c. inner view, x3.

58. Upper (?) lateral tooth: a. front view, x2; c. inner view, x2; e. tooth upright, x2.
59. *Spinax major* Agassiz. — Greenish black muds of the Šventoji river; b. side view, x2.

Plate III.

60. *Notidanus microdon* Agassiz. — Chalk with *Rhynchonella octoplicata* (Skirsnemuné); a. outer face of the upper tooth, x2.
61. *Ptychodus latissimus* Agassiz. — Zone of *Actinocamax mammillatus* (Pajiesys); e. upper surface, nat. size.
62. *Ptychodus mammillaris* Agassiz. — Zone of *Rhynchonella octoplicata* (Skirsnemuné); e. upper surface, x2.
- 63—67. *Corax falcatus* Agassiz. — Zone of *Actinocamax plenus* (Veršvai).
63. Anterior tooth: a. front view, x2.
64. Lateral tooth: a. front view, x2.
65. Lateral tooth: a. front view, x2.
66. Posterior lateral tooth: a. front view, x3.
67. Posterior lateral tooth: a. front view, x3.
68. *Corax aff. jaekeli* A. S. Woodward. — Zone of *Actinocamax mammillatus* (Pajiesys); a. front view, x3; c. inner view, x3.
69. *Pseudocorax laevis* Leriche. — Chalk with *Actinocamax mammillatus* (Pajiesys); a. front view, x3; c. inner view, x3.
- 70—71. *Scapanorhynchus raphiodon* Agassiz. — Zone of *Actinocamax mammillatus* (Naukiemis).
70. Anterior tooth: a. front view, x2; b. side view, x2; c. inner view, x2.
71. Upper right lateral tooth: a. front view, x2.
- 72—75. *Scapanorhynchus raphiodon* Agassiz, var. *tenuis* Davis.—Greenish black muds.
72. Anterior tooth (denticles broken off): a. front view, x3; c. inner face, x3.
73. Anterior tooth: a. front view, x3.
74. 2nd anterior tooth: a. front view, x2.
75. Lateral tooth: a. front view, x2.
- 76—83. *Odontaspis subulata* Agassiz. — Greenish black muds of the Šventoji and Neris rivers.
77. Upper anterior left tooth: a. front view, x2; b. side view, x2.
78. „Eye-tooth“: a. front view, x2; b. side view, x2.
79. Upper left lateral tooth: a. front view, x2; b. side view, x2.
80. Lower symphyseal tooth: a. front view, x2; c. inner view, x2.
81. Lower (?) left anterior tooth: a. front view, x2; c. inner view, x2.
82. Lower lateral tooth: a. front view, x2.
83. Lower posterior lateral tooth: a. front view, x2.

Plate IV.

- 84—95. *Odontaspis striatula* nov. sp.. — Greenish black muds of the Šventoji and Neris beds.  
84. Upper symphyseal tooth: a. outer view, x2; b. side view, x2.  
85. Upper left 2nd anterior tooth: a. outer view, x2.  
86. „Eye-tooth“: a. outer view, x2; b. side view. x2.  
87. Upper right lateral tooth: a. outer view, x2; c. inner view, x2.  
88. Upper left lateral tooth: a. outer view, x2.  
89. Upper right posterior lateral tooth: a. outer view, x3.  
90. Lower symphyseal tooth: a. outer view, x2.  
91. Lower right 1st anterior tooth: a. outer face, x2; c. inner face, x3.  
92. Lower right 2nd anterior tooth: a. outer face, x2; b. side view, x3.  
93. Lower right lateral tooth: a. outer face, x2.  
94. Lower lateral tooth: a. outer face, x2; c. inner face, x2.  
95. Lower posterior lateral tooth: a. outer face, x3.  
96—101. *Odontaspis macrorhiza* Cope. — Greenish black muds of the Šventoji and Neris rivers.  
96. Upper symphyseal tooth: a. outer view, x2.  
97. Anterior tooth: a. outer face, x2.  
98. „Eye-tooth“: a. outer face, x2; b. side view, x2.  
99. Lateral tooth: a. outer face, x2; c. inner face, x3.  
100. Lower symphyseal tooth (denticles broken off): a. outer face, x2.  
101. Lateral tooth: a. outer face, x2.  
102—103. *Odontaspis gigas* A. S. Woodward.  
102. Anterior tooth (zone of greenish black muds): a. front view, nat. size and x2; b. side view, x2; c. inner view, x2.  
103. Ditto, more posterior tooth (zone of *Actinocamax plenus*): a. front view, x2; b. side view, x2.

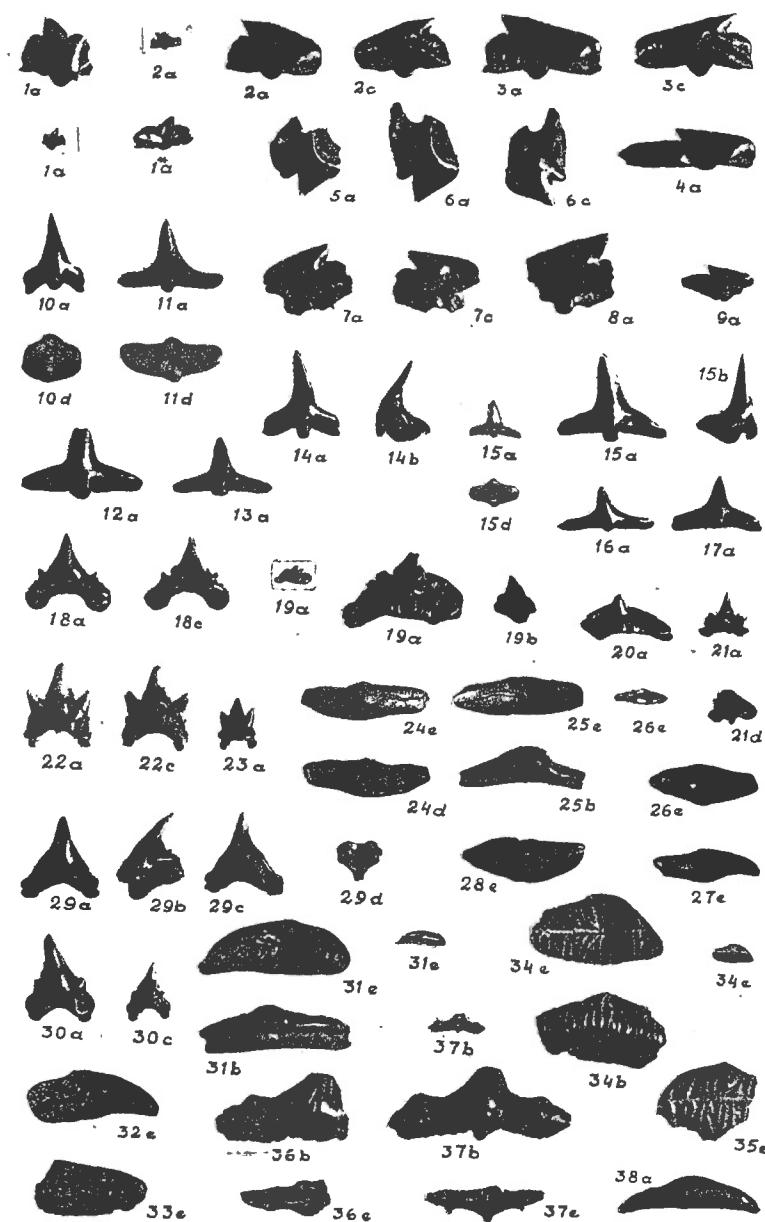
Plate V.

- 104—109. *Lamna appendiculata* Agassiz. — Greenish black muds.  
104. Anterior tooth: a. outer face, x2; b. side view, x2.  
105. „Eye-tooth“: a. outer face, x2; b. side view, x2; c. inner view, x2.  
106. Anterior lateral tooth: a. outer face, x2; c. inner face, x2.  
107. Lateral tooth: a. outer face, x2.  
108. Lateral tooth: a. outer face, x2.  
109. Posterior lateral tooth: a. front view, x2.  
110—111. *Lamna cf. semiplicata* (Münster) Agassiz. — Greenish black muds of the Šventoji river.

110. Lateral tooth: a. outer face, x2; c. inner face, x2.  
111. Posterior lateral tooth: a. outer face, x2.  
112—113. *Lamna cf. crassa* Agassiz. — Greenish black muds.  
112. Lateral tooth: a. outer face, x2.  
113. Posterior lateral tooth: a. front view, x2.  
114—118. *Oxyrhina (?) primaeva* nov. sp.. — Greenish black muds of the Šventoji and Neris rivers.  
114. Anterior tooth: a. outer face, x2; c. inner face, x2.  
115. Anterior lateral tooth: a. outer face, x2; c. inner face, x2.  
116. Lateral tooth: a. outer face, nat. size and x2.  
117. Ditto, more posterior tooth: a. outer face, x2.  
118. Posterior lateral (?) tooth: a. outer face, x2; b. side view, x2; c. inner face, nat. size.  
119—120. *Oxyrhina cf. angustidens* Reuss.  
119. Lateral tooth (zone of *Actinocamax plenus*) a: outer face, x2.  
120. Lateral tooth (zone of *Rhynchonella octoplicata*): a. outer face, x2.

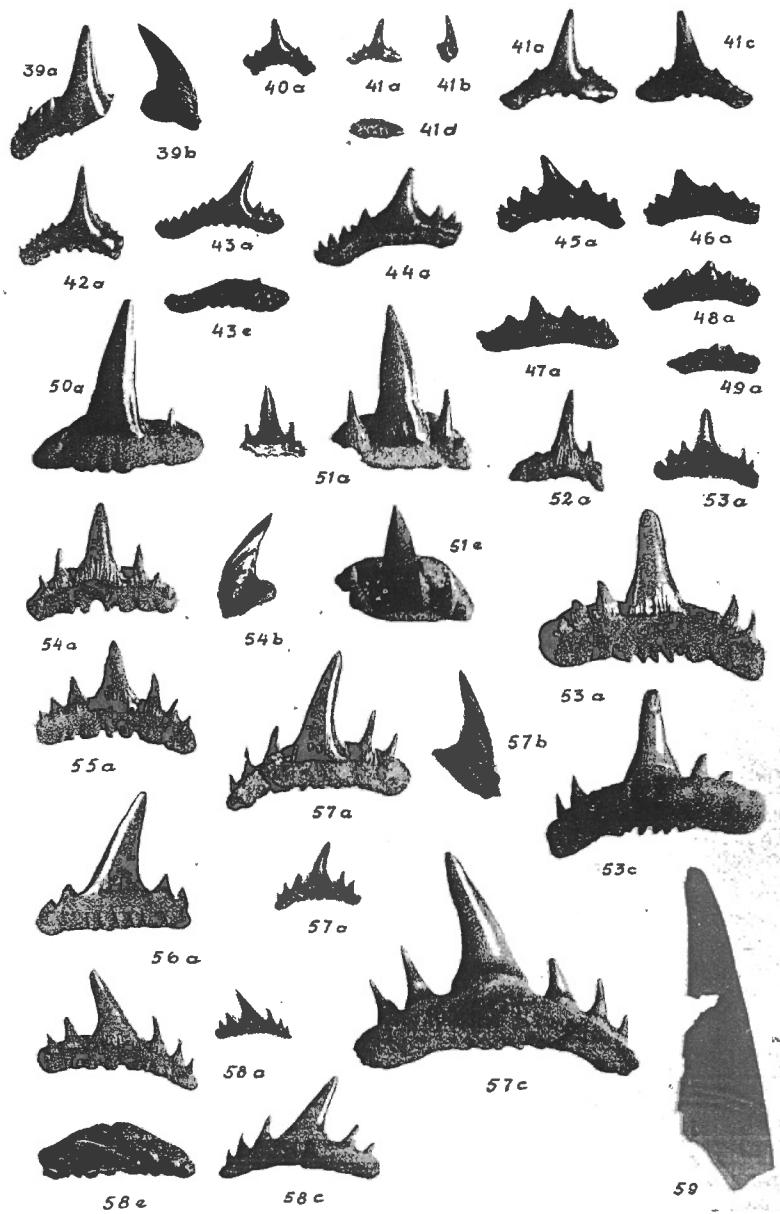
TAB. I

PL. I



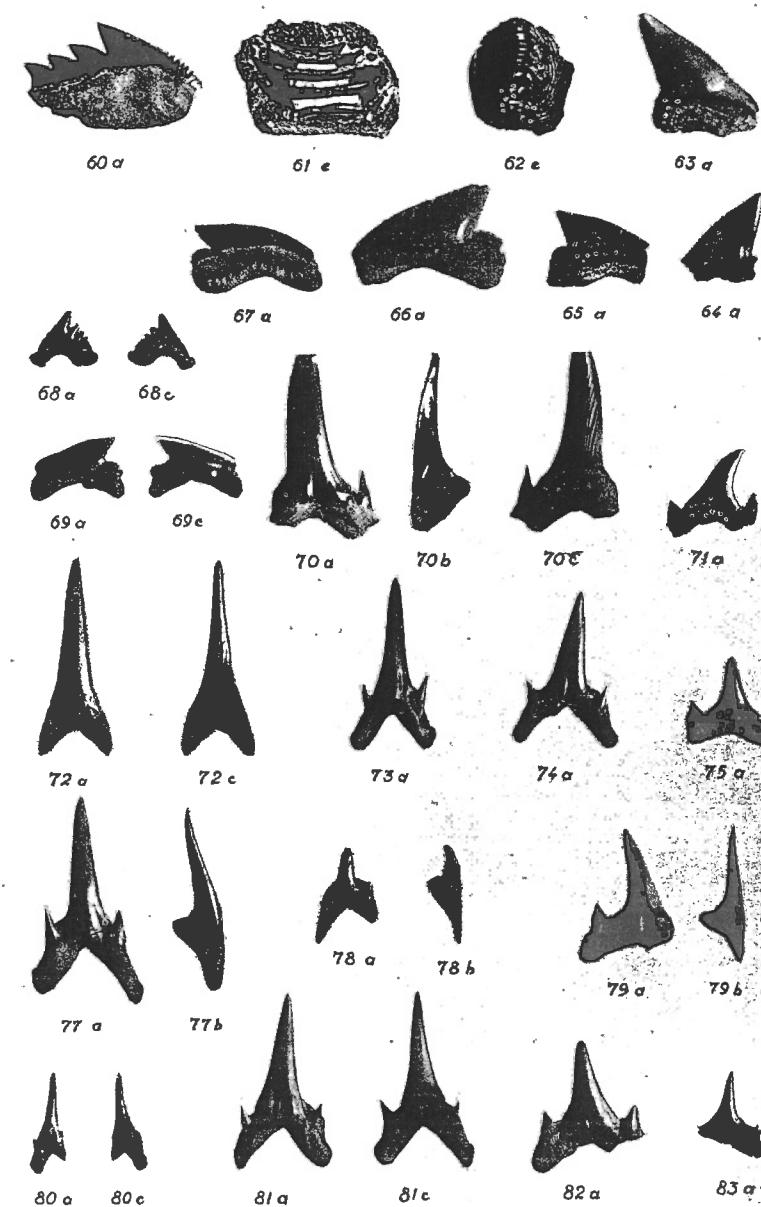
TAB. II

PL. II



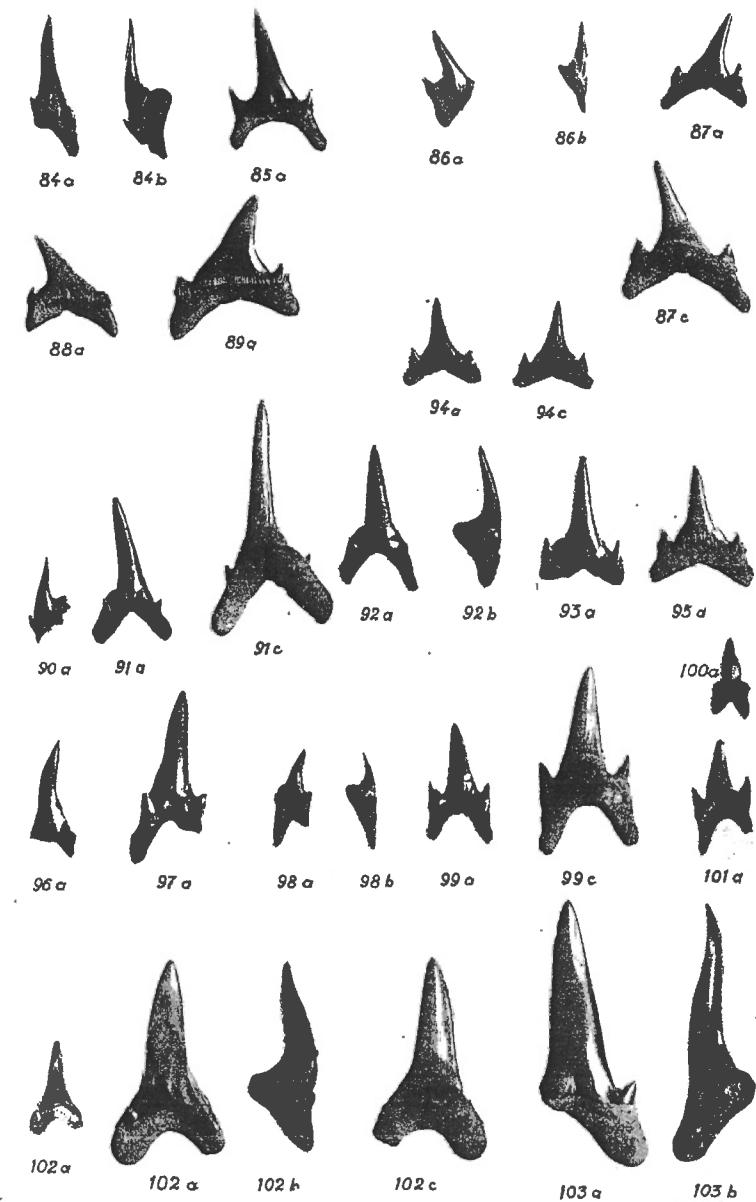
TAB. III

PL. III



TAB. IV

PL. IV



TAB. V

PL. V

