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Diagnoses of the new forms of Vertebrates and Plants from the Upper Permian on North Dvina.

(Extracted from the inedited memoir of † prof. V. Amalitzky and presented to the Academy with a preface by A. Karpinsky, on November 29th 1922).

The late Prof. V. Amalitzky discovered, as is known, in the Neo-Permian fresh-water sediments on the North Dvina a remarkable, unique in its way, deposit of fossil reptiles, amphibia, mollusks, and plants of Glossopteris flora. The locality represents a river-bed (creek) filled out with sandstone with a lens-shaped exposure in an escarpment of the river bank. Hard limy concretions included in relatively loosely cemented sandstone contain isolated parts of animals, as well as whole skeletons, frequently of considerable size. The complicate shape of big concretions reveals usually the position of the head, body, and extremities of the animal. The concretions would evidently be formed immediately after the burial of the animal while the ligaments between the bones were not yet decomposed, and thus the skeletons became preserved in their natural connection.

After preliminary reconnoissance Prof. Amalitzky undertook in 1899 systematical researches at which took part Mrs Anne Amalitzky, his constant companion and assistant. The digging was being continued up to 1914 when it was stopped on account of unfavourable circumstances.

The researches revealed the quite exceptional scientific value of the North Dvina deposits: abundance of complete skeletons, original complex of organic forms among which specimens of *Pareiosaurus* and *Dicynodon* are particularly numerous, which, together with mollusks and plant remains, points out to their close affinity to South African forms, the originality of some forms (*Inostranzevia* etc.), the way of their distribution within the lens (i. e. in the river-bed) — all this furnishes a rich evidence for deduc-

tions in stratigraphy, paleogeography, phylogeny, ethology etc., as it is shown in prof. Suškin's brief but demonstrative review of the collection of North Dvina fossils exhibited in the Geological and Mineralogical Museum of the Academy of Sciences of Russia (Petrograd, 1922, pp. 56—62).

The collections of the Museum contain at present 10 complete mounted skeletons of Pareiosauria, 1 skeleton of a young specimen, 1 skeleton within the matrix keeping the position it was found in, and 1 concretion including a skeleton of a big animal, 2 large complete mounted skeletons of *Inostranzevia,* whole specimens of *Kotlassia* and *Dvinosaurus,* some skulls of *Dicynodon,* 1 skull of *Anna,* and other unica, as *Dvinia* etc. All these specimens are but part of materials yet unprepared in possession of the Museum, and over 100 tons of concretions digged out and kept out of Petrograd promise another series of discoveries. Prof. Amalitzky's collection contains moreover remains of *Venyukovia* n. gen. which is perhaps one of the most ancient mammals. This fossil was brought back by the late prof. Venĭukov, from the Permian cupriferous grit of Karghala, province of Orenburg.

It is evident from the above what scientific value represents the fauna meanwhile collected from but one geological horizon of the North Dvina deposits.

Prof. Amalitzky died suddenly at Kislovodsk, Caucasus, in December 1918. His manifold administrative business and complicate circumstances of the latter years strongly hindered the study of the fossils. In 1916 he presented to the Academy two preliminary notes on Dvinosauridae and Seymouridae and a more detailed Memoir on Dicynodontia, which were decreted to be published in a special edition «The North Dvina excavations by prof. Amalitzky». The first fascicle of this publication, the *Dvinosauridae,* issued in 1921, contains the description of a new genus of *Amphibia,* the *Dvinosaurus,* and short caracteristics of the species *D. primus, secundus,* and *tertius,* the remains of which are figured on 4 photographic plates. The second fascicle, the *Seymouridae* (1921), is treating of a new genus of the primitive reptiles, with two species, *Kotlassia prima* and *K. secunda* figured on 3 plates.

Prof. Amalitzky's widow delivered to the Academy in 1921 all his manuscripts, 6 on paleontological and 3 on geological subjects. They have been carefully revised by Profs. P. A. Pravoslavlev and P. P. Suškin. The geological papers and four of the paleontological ones may be published almost entirely, with few editorial modifications caused by the above mentioned difficulties and by the publication of new data in the foreign literature of the latter years, the russian students became acquainted

with only lately. The other manuscripts will be printed either in part or in abstracts. The further study of the fossils is carried on by the Members of the North Dvina Committee, Profs. Pravoslavlev and Suškin. The former is occupying himself with the study of *Gorgonopsidae* and has in view a new genus surpassing in size the *Inostranzevia*, and a new smaller species thereof. Prof. Suškin established some features in the structure of *Dvinosauridae* and *Dicynodontia*, suggested a new species of *Dicynodon*, and expressed some considerations on the ethology ot the latter group. The results of these studies were reported in scientific meetings of the Geological Museum and in Paleontological Society. Their publication is delayed until the papers of Prof. Amalitzky, to be referred to, be published, which cannot be soon realized. For that reason, and in view to communicate to the scientifie world the principal results reached by prof. Amalitzky, as well as to preserve his priority, the North Dvina Committee and the Academy have decreted to publish urgently a short extract containing the descriptions of new forms. The same is drawn up by profs. Pravoslavlev and Suškin.

The manuscripts of Prof. Amalitzky will be published in two extensive volumes with numerous plates and figures. The volume on paleontological subjects will be printed first and will consist, besides the two issued fascicles, of 7 more which are partly big monographs.

Beside the above-named profs. Pravoslavlev and Suškin, other prominent scientists will participate in the study and description of the North Dvina fossils with constant collaboration of Mrs Anne Amalitzky to whose pencil belong the annexed figures[1].

There is to notice that Prof. Amalitzky's researches and excavations were first undertaken by him with the moral and financial assistance of the Society of Naturalists of Petrograd, to which belongs also the honour of supporting the first steps of Amalitzky's work; later on, upon an agreement with the Academy of Sciences of Russia, the excavations were transmitted to the latter in 1908.

[1] The figures of skeletons and skulls of *Inostranzevia* and *Pareiosaurus Karpinskii* published by prof. Amalitzky and reprinted in Profs. Borissiak and Jakovlev's Textbooks as well as by Dr. O. Abel and others are not given below.

I. Dicynodontia.

Dicynodon Trautscholdi n. sp. (Fig. 1, 2).

The profile of the cranium roof is concave in the region of the for. parietale. The parietal crests meet together, the parietal region is twice as narrow as the orbital. The orbits are round, directed sidewards, forwards and upwards. The nasal foramen large and is situated nearer to the end of the snout than to the orbits. A strongly projecting alveolar flap. The canine of a middle size, directed downwards and forwards. The temporal arch thin. The occipital condyle semilunar and three-lobed. Condylo-basal length 100 mm.; the greatest breadth of the occipital region — 190, the distance of the articular surfaces of both quadrates 150, the breadth of the cranium in the postorbital region 180, orbital 115, between the canines 85, the height without the lower jaw 120.

Fig. 1.

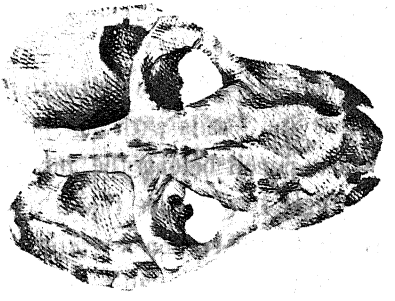

Fig. 2.

Gordonia Annae n. sp. (Fig. 3, 4).

Cranium heavily built, with a comparatively broad snout and, when viewed from above, with a straight posterior outline. The occipital plane very broad. Parietal region broad, with separated crests, only slightly narrower than the orbital region. The postorbital and the jugal arches stout. The nasal foramen is comparatively small, situated almost at the same distance from the orbit as from the end of the snout. A very strong laminar alveolar flap

with a strongly projecting crest-like lower edge. The crown of the canine tooth small, directed downwards and forwards. The profile of the cranium roof is almost equally vaulted. The surface of the nasal and frontal bones very rough. The occipital condyle three-lobed. Length from the snout to the occipito-temporal crest 245, breadth of the occipital plane — 245, between the articular surfaces of the quadrates 140, orbital region 200, height 140.

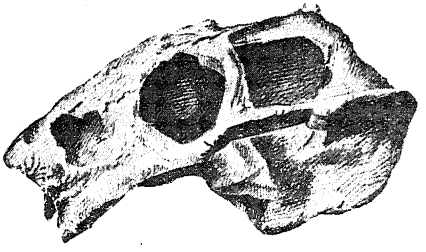

Fig. 3.

Fig. 4.

Gordonia rossica n. sp. (Fig. 5, 6).

A more light cranium with thin arches and wider nasal openings. The canine tooth short and is almost hidden from the exterior by the alveolar flap. The parietal region is twice as narrow as the frontal, the parietal crests nearly meeting together. Foramen parietale lies farther forwards. The length of the cranium from the snout to the occipito-temporal crest—185, the breadth of the occipital plane — 155.

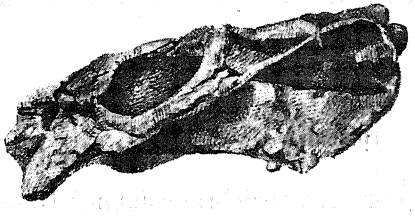

Fig. 5.

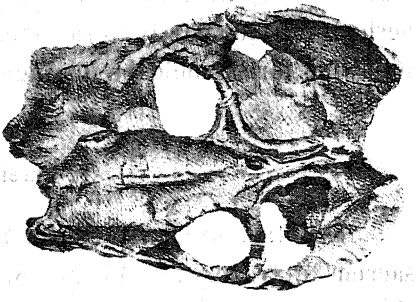

Fig. 6.

Oudenodon Venyukovi n. sp. (Fig. 7).

An equally arched profile of the cranium roof; the cranium, viewed from above, triangular, the parietal region is almost of the same breadth as the frontal, with widely separated crests. The jugal arch comparatively stout. The surface of the nasal bones rough. The canine is quite hidden in the interior of alveolar flap. The length from the snout to the occipito-temporal ridge — 210, breadth on the level of the postorbital region — 110, on the level of the orbits — 85.

Fig. 7.

II. Cotylosauria.

Pareiosauridae.

The collection consists of 150 groups of concretions with bones of «Pareiosaurus», 13 more or less complete mounted skeletons, 30 craniums and a number of isolated bones. The Pareiosauri of North Dvina are smaller than those of Africa (Karoo). Their prominent feature is a beautifully expressed sculpture of the cranium. A strong development of the cranial bosses, especially on its sides and on the snout and a stellate sculpture of the cranium roof, make them differ prominently from the typical *Pareiasaurus*. Perhaps they will prove to belong to the genus *Pareiasuchus* Broom & Haughton, or to a separate genus.

The Pareiosauri of North Dvina being very uniform in their principal features vary in the exterior sculpture and in the outlines of the cranium; perhaps it is due partly to the age, sex, and individual peculiarities. Hitherto following forms could be distinguished:

1. Pareiosaurus Karpinskii.

Length 245 cm. (the head 48 cm.) presacral vertebral column 145 cm., sacrum 30,5 cm., tail 41 cm. Star-shaped dermal plates are situated above the spinous processes of the vertebrae, two or three rows of similar plates lie on the sides of the body. There are also plates distributed, without an appa-

rent order, over the whole body (fig. 8); the belly was covered with small conical bosses.

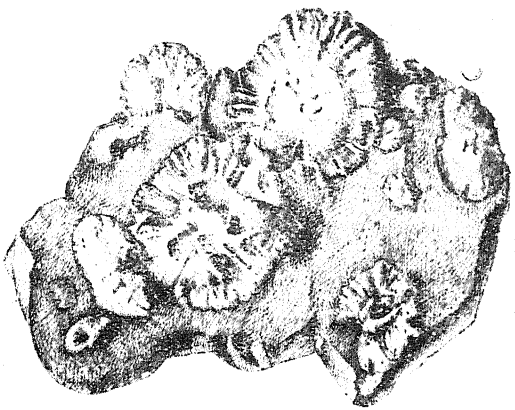

Fig. 8. × 1/4.

2. Pareiosaurus elegans.

Length 290 cm., with comparatively small head; length of the head 41 cm.

3. Pareiosaurus tuberculatus (Fig. 9).

Total length 260 cm., length of the cranium 41 cm.; with three rows of star-shaped dermal plates or the sides of the neck; in the tail region the plates are boss-like.

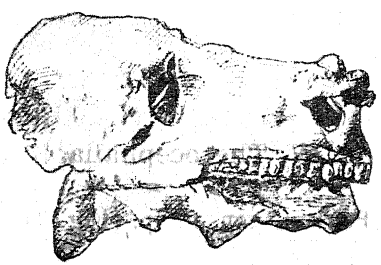

Fig. 9.

4. Pareiosaurus horridus.

Length 298 cm., length of the cranium 41 cm.; strong horn-like projections on the cheeks and on the lower jaw give to the head a monstruous aspect.

III. Theriodontia.

Inostranzevia Alexandri, n. gen. n. sp.

Two nearly complete skeletons, the one has a head with an open mouth and the other with a closed one. The cranium of a typical raptorial form of the group *Gorgonopsidae*, with strong teeth for catching and tearing the prey, and mightly developed jaws. Cuneiform unicuspidate teeth are differentiated into: incisors, canines and molars. All teeth are more or less compressed laterally and have finely serrated fore-and hind edges. The upper canines, when the mouth is closed, embrace from the sides the lower jaw and with their lower end reach its lower edge. The incisors are also very strong. Conical molars exist only in the upper jaw on its alveolar edge which is slightly turned upwards. The lower jaw has no molar teeth at all. There are indications that the change of the teeth took place by the young teeth developing at the root of the old ones, and supplanting them gradually. The structure of the cranium reminds, of the best studied forms of *Gorgonopsidae*, the genus *Gorgonops* Ow. The foram. pineale is situated still nearer to the posterior edge of the parietals and lies on a strong mamillar projection in the middle of an elongated trough-like impression. The skeleton is strong, but more lightly built than that of the Pareiosaurus. The ungual phalanges have an acutely-triangular form. The first specimen: length of the cranium 540 mm., breadth in the region of the canines 120 mm., in the region of jugal arches — 300 mm. Second specimen: length of a nearly complete skeleton — 2,97 m., the cranium — 505 mm., presacral vertebral column — 1,52 m., sacrum — 0,305 m.

IV. Therocephalia.

Anna Petri, n. gen. n. sp. (Fig. 10, 11).

Two middle-sized skulls without the lower jaw. The larger specimen well preserved, the smaller without occipital part and is slightly distorted. The dimension of the first: length 225—230 mm., the breadth in the premaxillary region—60 mm., at the orbits—130 mm., in the occipital region—160 mm. By its form reminds of *Scylacosaurus* Broom, but the cranium is broader and shorter, with a more obtuse end of the snout, the choanae are relatively longer and reach the level of the hindmost molar teeth, the posterior branches

of the right and left pterygoidea meet at the middle line at a more obtuse angle.

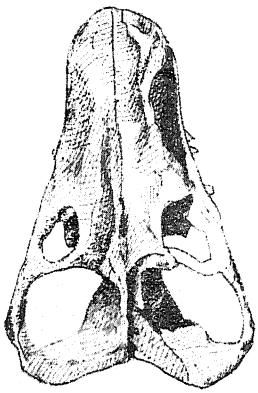

Fig. 10.

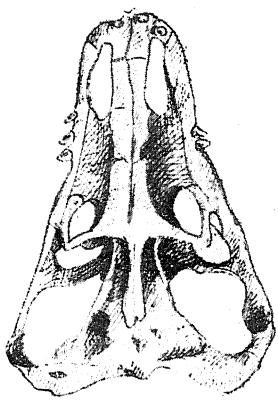

Fig. 11.

V. Cynodontia.

Dvinia prima, n. gen. n. sp. (Fig. 12, 13).

A small cranium without the occipital part and the lower jaw. The length of the specimen from the fore end of the snout to the sphenoidal region — 70 mm., the breadth at the middle of the upper jaw — 30 mm., at the fore edge of the orbit 60 mm. The whole habitus reminds of the *Gomphodontia*. The dental formula is: 0?—1—6—7. Incisors not preserved, perhaps they were wanting altogether. Canine directed forwards and slightly outwards, compressed from the sides, with sharp fore- and hind cutting edges, the hinder edge slightly concave and finely serrated. Premolars and molars acutely tuberculated and remind of those of the primitive Mammalia (Protodontia Osb.) Premolars more slender. Molars proper with transversely extended crowns. Premolars, with the exception of the haplodont first one, are constructed after the protodont type reminding of the teeth of *Trithelodon ricanei* Broom. Molars larger than the premolars, button-shaped, with swollen base of the crown and simple elongated and narrow root. The front 6 molars are of the same size, every one of them bearing 9 tubercles on the crown, the central one being more prominent than the others; the 7th or the hindmost molar is somewhat smaller and carries only 6 tubercles. After the common aspect of the cranium and the teeth *Dvinia* is near to the family Trithelodontia Broom (ord. Cynodontia) from the Stormberg series of the upper Karoo. It is also near to *Gomphognathus*, *Trira-*

chodon and *Diademodon* from the upper Beaufort-beds of Karoo, identifiep with a part of the European Trias.

Found in the upper part of the deposit on the North Dvina together with isolated bones of Pareiosaurus, Dicynodontia and Therocephalia.

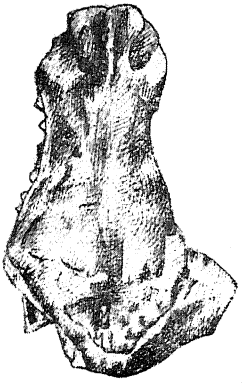

Fig. 12.

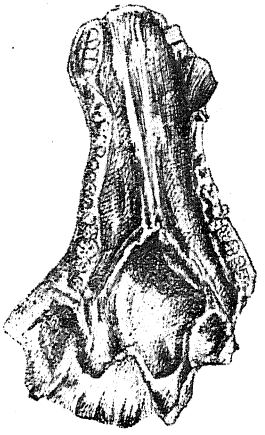

Fig. 13.

VI. Mammalia.

Venyukovia prima, n. gen. n. sp. (Fig. 14, 15, 16).

Represented by fragments of a silicated piece of a small skull and by the left branch of mandible with the symphysal region and one incisor of the right side. Found by Prof. Venĭukov in the copper-bearing sandstones of Karghala, Orenburgh region, belonging to the Perm deposits. In the fragment of the front part of the snout remains of the bases of teeth are seen; there are clearly visible the first pair of incisors nearly touching one another; they are round in their section and very strong; then follows one pair of lesser size; behind them are faintly visible remnants of some teeth more; there is no defined diastem. The lower jaw seem to belong to another smaller specimen of the same species as the silicated piece of skull. It carries typical features of a Mammal. The dental formula: 2.0.3.7. The front pair of incisors are massive, directed forwards, cylindrical in section, with an obliquely cut summit slightly hooked backward. The pulpar cavity very narrow. Close to them there is an other pair of teeth, less massive than the above mentioned, badly preserved,—perhaps the second pair of incisors. The molars are very worn; they are considerably more slender than the incisors, the root simple, deeply seated in the dental alveole, with a broad pulpar cavity.

Premolars seem to be haplodont, the crown is trigonid-like with feebly marked para- and metaconids and very clear cingulum. Molars of the same general form, feebly constricted below the cingulum; the latter is better marked on the inside and lies lower down than on the outside. The dental apparatus carries thus primitive features: simple root and the character of the crown of the molars with the middle cone more developed than the lateral, which are scarcely defined, — and in the same time features of specialisation: well developed cingulum and highly specialised incisors. *Venyukovia* must probably be classed among the order of Triconodonta Osb.

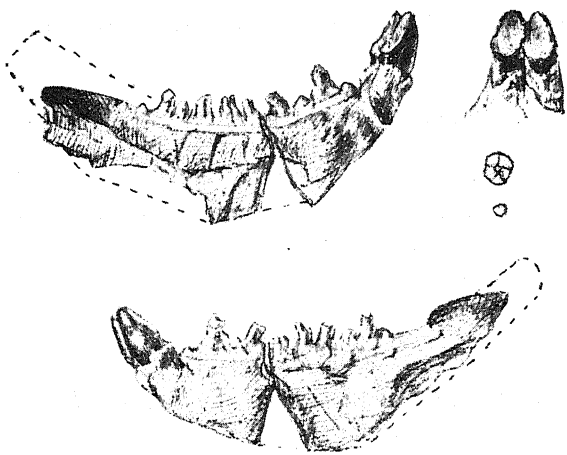

Fig. 16. From within.

Fig. 15. From above.

Fig. 14. From without.

Dictyopteridae from North Dvina.

Following already described forms were found: *Glossopteris indica* Schimper, *Glossopteris angustifolia* Brong., *Vertebraria*, *Gangamopteris major* Feistmantel. Moreover are to be distinguished:

1. **Glossopteris communis** var. **rossica.**

Leaves are slightly narrower than those of the same type from India, length 30 cm., breadth 6 cm. The nervation of the leaf is more coarse, the secondary nerves are thicker than in the type, the midrib seems to be absent.

2. **Glossopteris indica** var. **psygmaphylloides.**

Somewhat reminds of *Psygmaphyllum expansum* and *Psygmaphyllum cuneifolium*, described by Schmalhausen from the Permian of East Russia.

Differs from the type of *Glossopteris indica* Schimp. by the feeble development of the midrib on the top of the leaf, and by the outlines of the three feebly marked lobes. In its upper part the leaf is nearer to *Glossopteris communis* var. *stenoneura* Feistmant., but differs from it by the top of the leaf being more narrow. The length 25 cm. by a breadth of 6 cm.

3. **Glossopteris** sp.

Large leaves of which are preserved only impressions of the basal part. Reminds of *Glossopteris indica* Schimper. A very strong midrib covered with longitudial ridges; secondary nerves arise from the midrib at an acute angle.

4. **Gangamopteris cyclopteroides** var. **rossica.**

Very near to *Gangamopteris cyclopteroides* var. *attenuata* Feistmant., but more narrow than the indian specimens described by Feistmantel, and more constricted at the base of the leaf.

5. **Gangamopteris** sp.

Large leaves probably of the group of *Gangamopteris major* Feistmant.