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ON SOME MUSTELINAE FROM THE PLIOCENE BONE BRECCIA
OF WĘŻEStudy on the Tertiary bone breccia fauna from Węże
near Działoszyn in Poland

PART X*

Abstract. — This paper describes the remains of skulls and mandibles of three species, namely *Mustela pliocaenica* n. sp., *Mustela plioerminea* n. sp. and *Martes wenzensis* n. sp. By their characteristic features all the three described species come very near to their Pleistocene representatives as well as to the living forms.

INTRODUCTION

Several interesting larger carnivores¹ have, so far, been described from the Pliocene bone breccia in Węże near Działoszyn (province of Łódź). The writer has now identified from the same breccia the remains of their smaller relatives from the mustelid group. They are: *Mustela pliocaenica* n. sp. and *Mustela plioerminea* n. sp. from the subfamily of Mustelinae Gill, also *Martes wenzensis* n. sp. from the subfamily Martinae Burmeister.

* Parts I-V — see *Acta Geol. Pol.*, vol. II-V/1952-55; parts VI-IX — *Acta Palaeont. Pol.*, vol. I-III, 1956-58.

¹ *Arctomeles pliocaenicus* n. gen. & n. sp. from the Melinae subfamily. *Acta Geol. Pol.*, vol. II/1951. — *Ursus wenzensis*, new species of a small Pliocene bear. *Ibid.*, vol. III/195. — *Nyctereutes* (Canidae) in the Pliocene of Poland. *Ibid.*, vol. IV, 1954. — *Agriotherium intermedium* n. sp. from the Pliocene bone breccia of Węże. *Acta Palaeont. Pol.*, vol. II/1957.

DESCRIPTION

Mustela pliocaenica n. sp.

(pl. I, fig. 1-5; text-fig. 1)

The material on which this species has been established consists of a skull lacking the mandible, and of four mandibular fragments belonging to various individuals.

The skull is with the occipital part damaged and the zygomatic arches missing; the upper carnassial (P^4) and the first molar (M^1) represent the right side dentition, while the left side is represented by a fragmentary premolar (P^4) and a well preserved first molar (M^1).

Of the four detached mandibles, the first is a fragmentary left ramus (pl. I, fig. 2) in which the incisors and the canine are missing from the anterior portion, while M_2 and all the processes are absent from the posterior part.

The second specimen is likewise a fragmentary mandibular ramus with the anterior and posterior ends damaged, and P_3 as well as M_2 absent.

The third specimen represents the right mandibular ramus with the lower carnassial; the fourth one is a fragmentary left ramus of the anterior part of the mandible, with only the second premolar (P_2) and a small portion of the canine present.

Fossil finds of small sized weasels from Pliocene and Pleistocene beds have frequently been reported. On the close resemblance of the discovered fragments to analogous skeletal elements in the living weasel, *Mustela nivalis* L., they have, in most cases, been assigned to that species (Boule, 1910; Stehlin, 1923; Osborn, 1927; Heller, 1930; Pasa, 1947, et alii).

A detailed description of fossil mustelid remains collected in 1934, in Hungary was undertaken by Kormos. He had the opportunity to study adequately five fossil mandibles belonging to a small sized weasel which had been recovered from the hill of Nagyhársány near Villány (province Baranyi in Hungary), also a mandible from the Sackdilling cave in the Frankonian Jurassic. The mustelid remains recovered from the latter locality had previously been studied by Fl. Heller in 1930. He identified it as *Mustela vulgaris* Briss. (= *Mustela nivalis* L.).

When comparing the mandibles of fossil weasels with that of the living *Mustela nivalis*, Kormos emphasized several structural differences on which he established a new species, i. e. *Mustela praenivalis* Kormos, to accomodate the Pleistocene weasel.

According to that author, the differences between *Mustela praenivalis* Kormos and *M. nivalis* L. are as follows:

1. The posterior boundary of the masseteric fossa in *Mustela praenivalis* Kormos is more rounded and not so far anteriorly pushed as in

Mustela nivalis L., where it often extends below the talonid of M_1 , terminating in an acute angle.

2. Below the protoconid of M_1 (lower carnassial) a circular depression occurs labially; in *Mustela nivalis* L. this is either absent or very faintly indicated.

3. A very characteristic feature of *Mustela praeivalis* Kormos is the mandibular body, constantly growing stouter, higher and thicker. Lingually it displays ridge-like thickenings along a number of teeth, while elongate depressions occur below it. In *Mustela nivalis* L. the surface of the mandibular body is as a rule quite uniform lingually.

4. The height of the mandibular body measured lingually below the first molar is 2.5 mm in the Sackdilling specimen against 2.65—3.0 mm in the Nagyhársány specimens, with thickness 1.5 to 1.8 mm. In specimens of *M. nivalis* L. the height thus measured ranges from 1.85 to 2.6 mm, the thickness is 1.15 to 1.6 mm (see Table 1).

5. The lower carnassial (M_1) is slightly larger in the fossil weasel than in *Mustela nivalis* L. where it very rarely attains the length figure noted in the fossil form (see Table 1).

Moreover, Kormos reports differences in mandibles of these mustelid species. In *Mustela praeivalis* Kormos the articular process is longer, the attachment of the external pterygoid muscle more distinctly indicated.

Upon closer investigation of the mandibular features in *Mustela praeivalis* Korm., as specified by Kormos, and their comparison with the corresponding characters of Węże mandibles and those of *Mustela nivalis* L., the following observations have been made:

Ad 1. The masseteric fossa in the Węże mandibles is anteriorly rounded, centrally deep. Anteriorly it reaches to a vertical line, drawn downwards from the point of contact between the protoconid and the talonid in M_1 ; thus in all of the Węże specimens it is seen to be pushed farther anteriorly than in *Mustela praeivalis* Kormos.

In specimens of *Mustela nivalis* L. from the vicinity of Kraków (south Poland) and the province of Polesie (White Russia), the anterior end of the masseteric fossa stretches equally far, i. e. to a vertical line, drawn downwards from the point of contact between the protoconid and the talonid in M_1 ; it is also similarly rounded, but never attains the width of that element noted in the Węże weasel.

Ad 2. A depression occurs below the protoconid of M_1 on the mandibles of the Węże specimens, which is neither deep nor sharply delimited from the remaining surface of the mandibular body, but somewhat expanded anteriorly and posteriorly. In shape it does not differ from the depression readily here discernible in specimens of the living weasel from the vicinity of Kraków and Polesie, which have been studied by the writer.

Ad 3. The lingual thickening of the mandibular body below a row of teeth, and the underlying depression, are faintly indicated in the Weże specimens. They are likewise indistinct in specimens of *Mustela nivalis* L. studied by the writer.

Ad 4. In all the Weże specimens the mandibular body is strong, high and thick. The height and thickness dimensions here exceed those asserted by Kormos for *Mustela praenivalis* Kormos, also those of the living *Mustela nivalis* L. (see Table 1).

Ad 5. The length of the first molar (M_1) is greater than that in *Mustela praenivalis* Kormos, being 4.8 to 5.5 mm against 3.0-4.1 mm in the latter form.

The length, width and height figures of P_2 and P_3 are higher for the Weże weasel (see Table 1).

Among the less significant details, we may note in the Weże specimens that, of the two usually present mental foramens, the anterior one is distinctly larger and occasionally subdivided into two smaller ones, so that three mental foramens are anteriorly observable in the mandible.

Neither Heller nor Kormos have had the opportunity to examine the skull of *Mustela praenivalis* Korm. The skull of a small weasel has, however, been discovered in the Weże breccia. Although its mandible is missing, yet the dimensions of the four above described mandibular fragments from the same breccia suggest that they belong to weasels of similarly small size (see Table 2).

In section this skull slopes gently anteriorly from the frontals, while posteriorly it rises gently too, displaying a very slight depression at midlength. Viewed from above the skull tapers towards the front from the papillar processes, hence the brain case is ovate, elongated. Above the canines the skull is anteriorly somewhat narrower than in the post-orbital area. In the mastoidal area cranial width is less than the distance from the posterior margin of the occipital foramen to the internal nares. All the crests are clearly indicated on the skull surface: the external frontal, the sagittal and the lambdoid of the occipital bone. The auditory bullae moderately inflated and almost of uniform height and width throughout their length. This is nearly double the width: 1.8:1.0. Anteriorly the auditory bullae are bluntly transversely truncated and separated from the pterygoidal processes (hamuli) by a relatively broad free space. Posteriorly they are rounded. The orientation of the auditory bullae is mutually parallel so that their anterior distance is the same as the posterior. The osseous surface between the auditory bullae is nearly flat, with only a slight longitudinal median elevation.

On the whole, the shape of the skull and of its diverse elements closely resembles that observed in the living weasel *Mustela nivalis* L.

T a b l e 1
Measurements of teeth and mandibles (in mm)

Specimens→	<i>Mustela pliocaenica</i> n.sp. Węże, Poland				<i>M. praenivalis</i> Korm.			<i>M. nivalis</i> L.	
	I	II	III	IV	Kormos, 1934, Hun- gary	Heller, 1930 Sackdilling, Germany	Heller, 1938 Erpfingen, Germany	Kraków, south Poland	Polesie, White Russia
P ₁ longitudo	1.30	1.70	—	—	1.10 1.30	—	—	1.30	1.00
latitudo	0.80	0.87	—	—	0.75 0.85	—	—	0.50	0.80
altitudo	0.60	0.60	—	—	—	—	—	0.67	0.70
P ₂ longitudo	2.00	2.00	—	2.20	1.60 1.70	—	—	1.40	1.75
latitudo	1.13	1.00	—	1.30	0.80 0.85	—	—	0.73	0.90
altitudo	1.50	1.20	—	1.30	—	—	—	1.00	0.80
P ₃ longitudo	2.80	—	—	—	1.85 2.15	—	—	2.10	2.20
latitudo	1.08	—	—	—	0.95 1.10	—	—	1.06	1.00
altitudo	1.90	—	—	—	—	—	—	1.60	1.70
M ₁ longitudo (carn.)	5.50	4.80	5.10	—	3.40 4.00	3.90 4.00	3.60 4.10	4.33	4.30 4.60
latitudo	1.80	1.60	1.60	—	1.05 1.20	—	1.00 1.30	1.13	1.30 1.60
altitudo	2.30	2.10	2.10	—	—	—	—	1.93	2.00 2.40
P ₁ — M ₂ longitudo	13.00	11.40	—	—	—	8.50	—	8.80	10.20 10.40
Altitudo mandibulae	4.30	3.80	3.70	4.20	2.50 3.00	2.50	2.70	1.85	3.16 3.20
Latitudo mandibulae	2.30	2.00	1.90	2.10	1.50 1.80	—	1.40	1.15	2.00 2.20

T a b l e 2
Measurements of skulls (in mm)

Specimens→	<i>Mustela plicoenaica</i> Weże Poland	<i>M. nivalis</i> L. Poland	<i>M. nivalis</i> L. central Europe*	<i>M. nivalis boccamela</i> Bechst. Italy, south France*
Longitudo condylobasalis a — a**	47.0	34.8—41.8	♀ 30.0—36.4 ♂ 36.2—42.0	♀ 34.2—36.6 ♂ 37.4—46.6
Longitudo basalis b — b	41.0	31.0—38.2	—	—
Long. bullae tympanicae	14.5	11.25—13.0	—	—
Latit. maxim. bull. tympan.	8.2	6.5—7.9	—	—
Long. palati partis d — d	14.7	9.0—11.0	—	—
Latit. palati inter M ¹ —M ¹ e—e	5.0	4.5—6.2	—	—
Long. dentium [l—M ¹ c — c	15.0	11.0—12.0	—	—
Longitudo P ⁴ (carnas.)	5.0	4.0—4.4	—	—
Longitudo M ¹	3.4	3.0—3.2	—	—
Latit. posterior. partis M ¹	2.0	1.45—1.9	—	—

* According to Miller (1912).

** For particular indices — see fig. 1 on p. 107.

The only notable difference consists in greater cranial length of the fossil form, due to greater elongation of muzzle. This is clearly shown by the length ratio of that part of the palate which is enclosed by the hind walls of the incisors and a straight horizontal line drawn from the posterior margin of the molars to the distance between the lingual ends of these teeth (fig. 1 *d-d*, *e-e*). In the Weże skull this ratio is 14.7 : 5.0, i. e. nearly three to one, while in skulls of *Mustela nivalis* L. examined by the writer the respective figures are 9–11 : 4.5–6.2, i. e. 1.6 to 2.0 (see Table 2).

The condylo-basal length in the skull of the Weże weasel is 47 mm. This exceeds Miller's figure ascertained for European specimens of *Mustela nivalis* L., and for its larger southern races: *Mustela nivalis boccamela* Bechstein and the Spanish *Mustela nivalis iberica* Barrot-Hamilton.

A noteworthy though not highly important difference lies in that the first upper molar of the Weże specimen is differently placed in relation to the carnassial P⁴. In the Weże weasel it is distinctly oblique, in the living *Mustela nivalis* L. almost vertical. Hence results the nearly right angle between P⁴ and M¹ in the Weże weasel and the strongly acute angle in the living form.

The broad lingual portion of the above molar also has a slightly different appearance. In the Węże weasel it bears distinct minute cusps on the tooth cingulum with rays radiating from the protocone towards these tiny cusps.

In view of all the evidence provided by a thorough examination of the described fragmentary skulls belonging to the Węże weasel, it may reasonably be inferred that similarities between that fossil weasel and the living *Mustela nivalis* L. are only moderate. It is not impossible that, in the absence of more diagnostic differences in other skeletal elements of these weasels and provided their occurrence is not separated by long spans of geological time, they may be identified as subspecies of *M. nivalis* L.

Differences observed between the Węże weasel and *Mustela prae-nivalis* Korm., a Pleistocene form from Hungary and Germany studied by Heller and Kormos, are likewise of minor significance.

The living weasel is separated from the Pleistocene form and from the Pliocene Węże specimen, if not by geographical distance, in any case by great span of time. This will be most conveniently stressed by giving the oldest form of these three, here described, the name of *Mustela pliocaenica* n. sp.

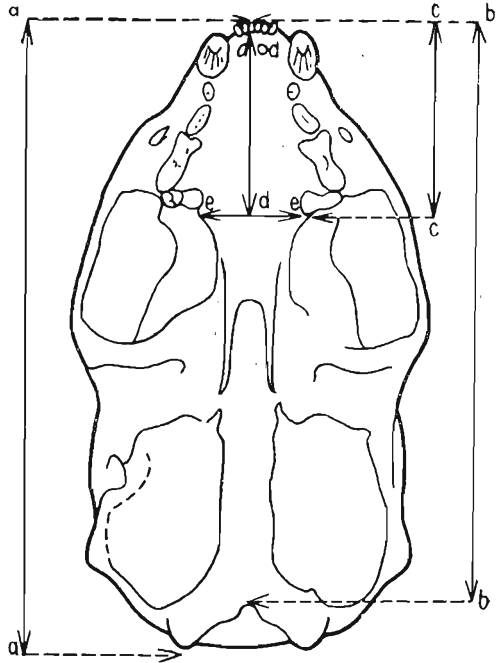


Fig. 1. Measurements of skull of *Mustela*
a-a basioccipital length, *b-b* basal length, *c-c*
length of tooth-row, *d-d* length of anterior
part of palate, *e-e* distance between the inner
ends of *M*¹.

Mustela plioerminea n. sp.

(pl. I, fig. 6)

An additional skull without the mandible, referable to another small mustelid species, has been recovered from the Węże bone breccia. It lacks the zygomatic arches, while the protruding ends of bones are worn or damaged. Dentition: incisors missing, crowns of canines broken off at the base; in the left half premolars have been preserved as well as remnants of the first upper molar; in the right half remnants of premolars and a complete molar.

The skull is elongate, gradually tapering anteriorly from the mastoidal processes. In section the highest elevation occurs near the occipital bones, very gently sloping anteriorly towards the muzzle, posteriorly somewhat more steeply. The slight doming of the frontal bone, noted in the skull of the living *M. erminea* L. is here unknown. Anteriorly, in the area overlying the canines, the skull is nearly as broad as in the postorbital area. The cranial width in the mastoidal area is distinctly smaller than the distance of the posterior margin of the occipital foramen from the internal nares. The cranial crests are worn. The auditory bullae moderately inflated, more or less bean-shaped owing to the slight expansion directly behind the auditory foramen, i. e. approximately at midlength, similarly as in *Mustela erminea* L. The length ratio of the auditory bulla to its maximum width is 1.5 to 1.0. The auditory bullae are anteriorly very bluntly truncated, posteriorly rounded. They are mutually divergent so that the 4.5 mm distance separating their anterior ends is hardly one half that between their posterior ends (9.2 mm). The osseous surface enclosed by the auditory bullae is centrally somewhat elevated, particularly so posteriorly.

The general appearance and dimensions of the skull and its several elements resembles those characterizing the skull of the living *Mustela erminea* L. (see Table 3). The condylo-basal length is, however, greater in the Weże weasel. In the various European *M. erminea* L. races the condylo-basal length ranges from 40 to 48 mm, the length of 52.4 mm being attained only very exceptionally by a male individual of the British *Mustela erminea stabilis* Barret & Hamilton. The length of the skull near the muzzle is greater in the Weże weasel than in Polish specimens of the *M. erminea* examined by the present writer, as is also the length of several teeth, hence of the whole tooth-row. As has been afore said, there also occurs a notable difference between the anterior and the posterior divergence ratio of the auditory bullae in the Weże weasel as compared with the living *M. erminea* L.

The fossil remains of a weasel of the type of the living *M. erminea* L. are frequently encountered in deposits of early and later Pleistocene age.

In 1864, on evidence of similar fossils, i. e. a fragmentary mandible recovered from the Pleistocene strata of Beremend in Hungary, Petényi established a new fossil species of weasels: *Foetorius palermineus* Petényi.

In 1930, Heller referred to the same species *Mustela palerminea* (Petényi), a mandibular fragment collected from the Sackdilling cave of the Frankonian Jurassic, and again, subsequently, in 1958, from Erpfingen (Schwäbische Alb) which may be dated almost analogously as the Hungarian species.

Table 3
Measurements of skulls (in mm)

Specimens →	<i>Mustela plioerminea</i> Węże Poland	<i>Mustela erminea</i> Poland	<i>Mustela erminea</i> L. (according to Miller)	
			♀	♂
Longitudo condylobasalis a — a*	52.5	43.4-47.0	41.6-45.0	41.6-51.2
Longitudo basalis b — b	49.3	39.2-42.0	—	—
Long. bullae tympanicae	15.7	13.7-14.0	—	—
Latit. max. bullae tympanicae	9.6	8.2-8.9	—	—
Long. palati partis d — d	16.0	12.5-13.2	—	—
Latit. palati inter M ¹ -M ¹ e—e	6.8	6.5-7.2	—	—
Long. dentium I ¹ -M ¹ c — c	18.0	14.5-16.5	10.8-12.0	12.2-13.8
P ¹ longitudo	2.3	1.0-1.5	—	—
latitudo	1.5	1.0	—	—
altitudo	1.5	1.0-2.0	—	—
P ² longitudo	3.0	2.2-2.6	—	—
latitudo	1.8	1.0-1.3	—	—
altitudo	2.0	2.0	—	—
P ³ (carn.) longitudo	5.8	4.8-4.9	—	—
(front.) latitudo	3.0	2.5	—	—
altitudo	3.5	2.5-3.0	—	—
M ¹ longitudo	4.5	4.0	—	—
latitudo	3.0	2.0-2.2	—	—

* For particular indices — see fig. 1 on p. 107.

In 1934, Kormos had the opportunity to thoroughly examine a great number of mandibles belonging to the same species, collected from beds of Nagyhársány, Csarnóta and Pilisszántó in Hungary. On this material he demonstrated certain differences in shape and size of mandibular teeth belonging to *Mustela palerminea* (Petényi) and its subspecies *Mustela palerminea praeglacialis* (Kormos), as compared with *M. erminea* L. mandibles, abundant in later Pleistocene strata of Hungary.

Moreover this species is reported by Kretzoi (1938) from other localities of Hungary. Brunner (1952) reports them from the Pottenstein cave (Oberfranken) in strata assigned by him to the close of the Mindel glaciation or to the beginning of the Riss.

Mandibular fragments belonging solely to the above considered species were available to all these palaeontologists. Lack of the lower jaw in the skull of the Węże weasel does not, unfortunately, permit a comparison

of that weasel with the Pleistocene *Mustela palerminea* (Petényi). We may only venture the suggestion that certain differences existed between the Pliocene *M. plioerminea* n. sp. from Węże and the Pleistocene *M. palerminea* (Petényi), similarly as between the weasel *M. pliocaenica* n. sp. and the Pleistocene *M. praenivalis* Kormos. The name of *M. plioerminea* n. sp. is, therefore, analogously proposed by the present writer for the Pliocene, pseudo-ermine form from Węże. This name would suggest that in appearance the skull of this Pliocene form comes near to the type of the living *M. erminea* L. though they are separated by a long span of geological time.

Martes wenzensis n. sp.

(pl. II, fig. 1-4)

In addition to small mustelid remains, the Węże breccia has also yielded some skeletal fragments belonging to larger sized species from the group Martinae Burm. These fossils consist of a relatively well preserved skull (pl. II, fig. 4) together with a closely adjoining mandible. The zygomatic arches are missing, as well as the upper mandibular branches; the osseous cover and the dentition are partly damaged. For the purpose of description the lack of some parts of dentition in this skull may be supplemented by data provided by the examination of the anterior portion of skull belonging to another specimen, also the fragmentary mandible of a third individual.

The shape of skull differs somewhat from the cranial type noted in the living *Martes martes* L. In the living *Martes* the apical point of the cranial elevation occurs on the occipital bones, approximately coinciding with the vertical line drawn into the auditory foramen area; from there the roof of the skull gently descends to the nasal foramen, depressing in its course only where the cerebral area passes into the facial. In the Węże skull, the apex of the cranial elevation occurs about midlength. From that point it descends in an arch, uniformly domed both towards the nasal foramen and to the rear of skull. Viewed from above the cranial width is seen to decrease anteriorly from its maximum about the auditory bullae. Measured above the canines the width is less than half that measured near the auditory bullae. Near the muzzle cranial width is distinctly smaller than in the postorbital area. The postorbital processes are short, the semicircular lines of the frontal bones radiating from them converge far posteriorly at an acute angle, and unite with the sagittal crest of moderate height. The supra-occipital crests are developed similarly as in the living *Martes*. In shape the auditory bullae resemble those in the

living form, i. e. they are relatively broad, moderately inflated, with a slight depression stretching approximately in the centre along the entire length, so as to separate the swollen internal part from the external which is flatter. The length/width ratio in the auditory bullae is close to that noted in the living *Martes*, the figures being 1.5 and 1.32—1.38 respectively. The auditory bullae are mutually placed so that their posterior divergence is slightly greater than in the living *Martes*. A conspicuous central elevation occurs on the surface of the basi-occipital part. The palate is moderately broad, its *d-d* to *e-e* length ratio, i. e. covering the distance between the molars, is 3 : 1 (see fig. 1).

Dentition. Strongly damaged anterior portion of both jaws do not permit a description of the incisors and canines. Both, the mandibular and the maxillary first molar are missing, but their alveoles suggest that they were extremely small, one-rooted, tightly squeezed in between the canine and the second premolar. The shape of the remaining premolars and of the maxillary molar resembles that typical of the living *Martes*, except that in the Weże marten, all the teeth are distinctly longer at the base, and stouter. P^2 is shaped like a nearly regular high-topped triangle. P^3 is slightly more elongate posteriorly where its sharp edge descends from the apex downwards. The upper carnassial is much longer and stouter than that in the living *Martes*. It has a low protocone, a high strong paracone with a sharp cutting edge extending to the metacone. The molar is longer too, with a part of the external tubercles relatively high, descending to the expanded lingual portion of the crown.

The mandible is stout, 2.5 mm higher than in the living *Martes*, in shape of teeth resembling the living form. The preserved alveole of the first premolar indicates that it was small, one-rooted, tightly squeezed in between the canine and the second premolar. P_2 is posteriorly elongate. A slight tubercle-like doming is present in P_3 on the posterior margin descending from the top of the tooth. In P_4 this doming grows into a distinct cusp, pushed out towards the cheek. The lower carnassial is stout, with a high protoconid, a relatively low paraconid, strong metaconid, and a low, rather flat talonid. The complete length of that tooth-row is greater than the corresponding element in the mandible of the living *Martes*.

A summary of the above mentioned observations concerning the fossil remains of the Weże marten and their comparison with the corresponding skeletal parts in the living *Martes* indicate that the fundamental differences between these forms consist solely in the greater dimensions of the complete skull and of its particular elements in the fossil species, though these two forms are separated by a long span of geological time.

Fossil remains of martens belonging to those remote periods are frequently encountered beginning with Miocene beds. However, a great number of their species have been created on very fragmentary material, not diagnostic enough.

Sufficiently copious material was, however, available to Zdansky, for *Mustela palaeosinensis* Zdansky, 1924. The remains of that marten had been discovered among a fossil fauna of carnivores from the territory of the present province of Schan-shi in north-eastern China, which he was then investigating. The majority of material examined by Zdansky was collected from strata containing a well preserved Hipparion-fauna, some of it, however, though found in China, is stated to be of "unbekannter Herkunft und unbekannter Alters".

The skulls of *Mustela palaeosinensis*, examined by Zdansky, differed in certain details of shape and size. Taking, however, into account the possibility of strong variations of this fossil marten, they were all regarded by that author as conspecific.

The fossil remains of the Weże marten display close similarities with the Chinese *Martes palaeosinensis* (Zdansky). Differences in the size and shape of teeth are unimportant, the average figures in *M. palaeosinensis* being only slightly higher, as is shown in a dimension chart given in tables 4 and 5.

Some differences, however, may be noted here, too. In all the examined Weże specimens the first premolar was functional in both jaws, while in *M. palaeosinensis* this tooth is unknown, with the exception of one mandibular specimen only. No traces of cusp can be detected on the posterior margin of the third mandibular premolar in the Chinese specimens. In P_4 the cusp on the posterior margin is stronger in martens from China than in that from Weże, being at the same time pushed farther towards the apex of the crown. In the lower carnassial the protoconid is rectilinearly triangular in the Weże specimen, while in the Chinese marten the paraconid is higher, typically carnassial. In *M. palaeosinensis* the maxillary first molar (M^1) is shorter and more massive, in section more broadly elliptical.

Other fossil martens are of similar size as the Weże specimen, e. g. *Mustela pentelici* Gaudry, 1861, so far known on one mandibular ramus collected from Pikermi, also *Martes woodwardi* Pilgrim, 1931, a species established on a single mandibular fragment, likewise recovered from Pikermi, and *Mustela leporinum* Khomenko, 1914, from Tarakla in Rumania. Teeth, similar in shape, have also been encountered in martens of considerably smaller size, such as *Martes laevidens* Dehm, 1950, from the Middle Miocene (Burdigalian) in Eichstätt (Bavaria), or *Mustela anderssoni* Schlosser, 1924, from the Hipparion-fauna of Mongolia, etc.

Table 4 — Measurements of skulls (in mm)

Cranium et maxilla	<i>Martes wenzensis</i> n.sp.		<i>Martes palaeosinensis</i> (Zdansky) C h i n a							<i>Martes martes</i> L. Poland				<i>Martes martes</i> L. (according to Miller)	
	I	II	I	II	III	IV	V	VI	VII	I	II	III	IV	♀	♂
Long. condylo- basalis	—	91.0	—	—	—	—	—	—	—	73.5	73.2	81.6	76.5	77.0-80.0	79.0-88.0
Long. basalis	—	85.5	—	—	—	—	—	—	—	70.3	68.2	75.0	71.7	—	—
Latit. mastoidalis	—	40.0	—	—	—	—	—	—	—	34.5	34.4	37.0	35.4	36.0-39.4	37.4-42.2
Latitudo postorbitalis	—	23.3	—	—	—	—	—	—	—	19.6	17.7	19.4	20.0	19.6-21.8	19.2-23.2
Latit. frontalis	—	—	—	—	—	—	—	—	—	15.5	14.5	16.6	16.0	16.2-17.0	16.0-18.8
Longitudo palatini d — d	38.0	—	—	—	—	—	—	—	—	30.0	28.5	32.5	30.5	—	—
Latitudo e — e	13.0	—	—	—	—	—	—	—	—	10.0	9.5	10.0	11.0	—	—
Longitudo bullae ossae	—	21.0	—	—	—	—	—	—	—	12.3	18.0	18.3	18.0	—	—
Latitudo bullae ossae	—	14.0	—	—	—	—	—	—	—	13.0	13.0	13.3	13.7	—	—
Latitudo spat. frontal.	—	11.0	—	—	—	—	—	—	—	8.0	7.5	8.5	9.7	—	—
Latitudo spat. poster.	—	17.0	—	—	—	—	—	—	—	11.5	11.0	12.0	12.0	—	—
P ¹ longitudo	—	—	2.1	2.0	2.2	2.2	1.8	2.1	—	—	—	1.5	—	—	—
latitudo	—	—	2.2	2.3	1.6	2.2	1.6	1.9	—	—	—	2.0	—	—	—
altitudo	—	—	—	—	—	—	—	—	—	—	—	3.0	—	—	—
P ² longitudo	5.8	—	5.7	5.5	5.7	5.1	4.2	4.5	—	4.1	3.8	4.1	4.0	—	—
latitudo	3.0	—	2.4	2.5	2.4	2.4	2.3	1.9	—	2.1	2.1	3.0	3.0	—	—
altitudo	3.6	—	—	—	—	—	—	—	—	3.5	3.1	3.5	3.0	—	—
P ³ longitudo	6.5	—	7.2	7.3	7.0	6.8	6.0	5.6	7.7	5.0	5.0	5.9	5.0	—	—
latitudo	3.0	—	3.5	3.7	3.3	3.4	2.8	2.6	3.7	2.9	2.5	3.0	2.3	—	—
altitudo	4.2	—	—	—	—	—	—	—	—	3.0	3.2	3.4	3.0	—	—
P ⁴ longitudo	12.0	—	11.3	11.4	10.0	10.3	9.3	9.0	11.5	8.5	8.0	7.9	7.8	8.2-9.0	8.8-9.6
(carn.) latitudo	5.2	—	6.7	6.5	6.4	5.9	5.7	4.6	6.7	5.1	5.0	5.6	5.5	5.2-5.4	6.0-6.8
altitudo	6.0	—	—	—	—	—	—	—	—	4.9	4.0	4.9	3.0	—	—
M ¹ longitudo	10.5	—	10.7	10.7	10.5	10.2	9.5	8.5	10.9	8.5	7.6	8.6	8.0	7.8-8.2	8.8-10.0
latitudo	6.6	—	6.7	7.2	6.9	6.7	5.9	5.2	7.6	6.0	5.0	6.5	4.5	4.6-6.0	4.4-7.2
altitudo	2.0	—	—	—	—	—	—	—	—	2.5	2.5	2.2	2.0	—	—
Longitudo dent. I-M ¹	42.0	—	—	—	—	—	—	—	—	32.0	31.4	36.0	32.8	27.2-29.6	27.0-31.4

T a b l e 5
Measurements of mandibles (in mm)

Mandibula	<i>Martes wenzensis</i> n. sp.		<i>Martes palaeosinensis</i> (Zdansky) China				<i>M. pentelici</i> G. Pikermi	<i>M. leporinum</i> Khom. Romania	<i>M. laevidens</i> D. Bavaria	<i>Martes martes</i> L. Poland	
	I	II	I	II	III	IV				I	II
P ₁ longitudo	—	—	1.6	—	—	—	—	—	—	—	—
latitudo	—	—	1.6	—	—	—	—	—	—	—	—
altitudo	—	—	—	—	—	—	—	—	—	—	—
P ₂ longitudo	5.0	5.0	5.8	5.5	4.9	4.5	6.0	5.0	3.3	4.0	4.0
latitudo	2.5	2.3	2.7	2.7	2.5	2.0	—	—	—	2.7	2.8
altitudo	3.0	4.0	—	—	—	—	—	—	—	3.0	3.0
P ₃ longitudo	6.6	5.8	6.8	7.0	6.7	5.2	6.0	6.5	4.7	4.5	4.7
latitudo	3.0	2.8	3.2	3.1	2.9	2.4	—	—	—	3.0	2.0
altitudo	4.0	3.6	—	—	—	—	—	—	—	3.0	3.2
P ₄ longitudo	7.5	7.2	7.5	7.8	7.3	6.1	8.0	8.8	4.8-5.8	5.3	5.3
latitudo	3.6	3.0	3.8	3.8	3.3	2.7	—	—	—	3.0	3.0
altitudo	4.2	3.5	—	—	—	—	—	—	—	3.5	3.5
M ₁ longitudo	—	11.0	13.0	12.6	12.5	11.0	13.0	13.5	6.9-7.5	9.0	9.0
(carn.) latitudo	—	4.5	5.2	4.8	4.6	3.9	—	—	—	3.2	3.5
altitudo	—	4.5	—	—	—	—	—	—	—	4.5	4.6
M ₂ longitudo	—	—	4.8	5.0	4.3	—	4.0	—	3.4	—	—
latitudo	—	—	4.3	4.8	4.6	—	4.0	—	—	—	—
Altitudo mand.	11.2	10.0	—	—	—	—	—	—	—	7.5	7.5
Latitudo mandibulae	5.6	5.0	—	—	—	—	—	—	—	3.6	3.5
Long. dent. I-M ₂	—	35.0	—	—	—	—	—	—	—	29.4	26.0

The present writer believes that the Weże marten ought to be placed in a distinct species, as *Martes wenzensis* n. sp., stressing that, together with other better known species, it constitutes a group of martens of the type of *Martes palaeosinensis* (Zdansky), which is that most adequately known. The mentioned group existed in Eurasia during the Miocene/Pliocene boundary and also during the early Pleistocene, among the more or less impoverished Hipparion-fauna.

The new genus *Pliomartes* Kretzoi was in 1952 established by Kretzoi for *Mustela palaeosinensis* Zdansky, *Mustela pentelici* Gaudry and several others. According to Kretzoi, the characteristics of this genus are the presence of the first premolar, premolars elongate but low, mandible mostly very slender, and a tendency for the premolars to be broadly spaced.

According, however, to Kretzoi (*l. c.*, p. 15): "Martinen mit unreduzierter Bezahnung, wie wir sie heutzutage in *Martes* oder *Lamprogale* vor uns haben, sind aus den Hipparion-Faunen ganz unbekannt. Sämtliche Formen haben eine gewisse Reduktion, besonders was die P anbelangt, erlitten". Contrary to this, the first upper premolar was present in all the specimens of *Mustela palaeosinensis* Zdansky, in one specimen the first lower premolar too, and the species *M. palaeosinensis* Zdansky belongs to the Hipparion-fauna.

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JAN STACH

O NIEKTÓRYCH ŁASICOWATYCH Z PLIOCEŃSKIEJ BREKCJI KOSTNEJ
Z WĘŻÓW*Streszczenie*

Autor opisuje, na podstawie czaszek i szczęk wypreparowanych z plioceńskiej brekcji kostnej, znalezionej w miejscowości Węże koło Działoszyna, trzy nowe gatunki z rodziny Mustelidae, a mianowicie *Mustela pliocaenica*, *Mustela plioerminea* i *Martes wenzensis*.

Pierwszy z tych gatunków — *Mustela pliocaenica* — należał do grupy łasiczek o drobnych wymiarach ciała, a pod względem ogólnego kształtu czaszki i poszczególnych jej części zbliżał się bardzo do dzisiejszej łasiczki *Mustela nivalis* L. Wyraźniejsza różnica zaznacza się w większej długości czaszki łasiczki z Wężów, spowodowanej głównie znaczniejszym wydłużeniem się części pyszczkowej tego zwierzęcia. Niewielkie też różnice występują pomiędzy tą plioceńską łasiczką a *Mustela praenivalis* Kormos, opisaną przez Hellera i Kormosa z plejstocenu Niemiec i Węgier.

Drugi gatunek — *Mustela plioerminea* — większa od poprzedniej, typu dzisiejszego gronostaja *Mustela erminea* L., ma także pokrewną sobie formę w plejstocenie Węgier i Niemiec w postaci *Mustela palerminea* (Petényi). Także pomiędzy tymi trzema gatunkami nie zachodziły większe różnice w budowie części czaszki.

Z trzeciego gatunku — *Martes wenzensis* — znalazła się w brekcji czaszka niemal w całości zachowana (pl. II, fig. 4), nadto przednia część czaszki drugiego osobnika oraz pięknie zachowany fragment żuchwy. Kształtem i znaczniejszą wielkością czaszka z Wężów odbiega nieco od czaszki dzisiaj żyjącej kuny *Martes martes* L. Większa jest długość poszczególnych zębów i całego ich szeregu, znaczniejsza też wysokość i tęgość żuchwy, natomiast zasadniczy kształt zębów jest u obu tych gatunków kun podobny. Rozmiarami czaszki i zębów zbliża się kuna z Wężów do opisaney przez Zdansky'ego kuny *Martes palaeosinensis* (Zdansky) ze złóż z fauną hipparionową płn.-wschodnich Chin.

Różnice pomiędzy wszystkimi powyżej wymienionymi formami, a odpowiadającymi im dzisiaj żyjącymi gatunkami są tak niewielkie, że gdyby nie oddzielał ich od siebie tak długi okres występowania ich w przyrodzie, można by je uważać za podgatunki żyjących dzisiaj form.

Podobieństwo ich ze sobą wskazuje na bardzo wczesne, bo już w miocenie, ustalenie pewnego zasadniczego typu w obrębie niektórych łasicowatych, tak trwale, że typ ten nie uległ większym zmianom w przeciągu tak długiego okresu czasu.

OBJAŚNIENIA DO ILUSTRACJI

Fig. 1 (p. 107)

Pomiary czaszki *Mustela*: *a-a* długość podstawy potylicy, *b-b* długość podstawowa czaszki, *c-c* długość szeregu zębów, *d-d* długość przedniej części podniebienia, *e-e* odległość dojęzykowych brzegów M¹.

Pl. I

Mustela pliocaenica n. sp.Fig. 1. Czaszka, *a* z boku, *b* od dołu; wielk. nat.

Fig. 2. Fragment żuchwy; × 2.

Fig. 3. Fragment żuchwy, od przodu; × 4.

Fig. 4. Fragment żuchwy; × 4.

Fig. 5. Fragment żuchwy; × 4.

Mustela plioerminea n. sp.Fig. 6. Czaszka, *a* z boku, *b* od dołu; wielk. nat.

Pl. II

Martes wenzensis n. sp.Fig. 1. Żuchwa (*a, b*) odpreparowana od okazu fig. 4 na tej planszy; wielk. nat.

Fig. 2. Fragment połowy żuchwy; × 2.

Fig. 3. Fragment przodu czaszki; wielk. nat.

Fig. 4. Czaszka wraz z żuchwą, z boku; wielk. nat.

ЯН СТАХ

О НЕКОТОРЫХ КУНЬИХ ИЗ ПЛИОЦЕНОВОЙ КОСТНОЙ БРЕКЧИИ
В МЕСТНОСТИ ВЕНЖЕ

Резюме

На основании черепов и челюстей отпрепарированных из плиоценовой костной брекчии, найденной в местности Венже близ Дзялошина, автор дает описание трех новых видов семейства Mustelidae, а именно *Mustela pliocaenica*, *Mustela plioerminea* и *Martes wenzensis*.

Первый из них — *Mustela pliocaenica* — принадлежал к небольшим ласкам и общей формой черепа и его отдельных частей очень близкий современной ласке *Mustela nivalis* L. Более отчетливое различие намечается в большей длине черепа ласки из местности Венже в связи с удлинением морды. Такие же небольшие различия между плиоценовой лаской и *Mustela praenivalis* Kormos, описанной Геллером и Кормошем (Heller и Kormos) из плейстоцена Германии и Венгрии.

Второй вид — *Mustela plioerminea* — больше чем предыдущий принадлежит к типу современной горностае *Mustela erminea* L. Родственной формой является тоже *Mustela palerminea* (Petényi) из плейстоцена Венгрии и Германии.

Также и эти три вида не обнаруживают каких нибудь более значительных различий в строении черепа.

С остатков третьего вида — *Martes wenzensis* — в брекчии найден почти полный череп (пл. II, фиг. 4), а кроме того передняя часть черепа другой особи и хорошо сохранившаяся часть нижней челюсти. Formой и большей величиной череп этот отличается несколько от черепа современной куницы *Martes martes* L. Нижняя челюсть выше и более массивная, а зубы и зубной ряд длинее у ископаемой куницы, но их форма в основном одинакова у обоих видов. Величиной черепа и зубов приближается куница из местности Венже к *Martes palaeosinensis* (Zdąnsky) из отложений северо-восточного Китая с гиппарионовой фауной.

Различия между всеми выше упомянутыми формами и соответствующими им современными так небольшие, что если бы не разделяющий их значительный промежуток времени, можно бы их считать подвидами современных форм.

Это сходство указывает на очень раннее установление среди куньих некоторого основного типа, который не подвергался изменению в течении так долгого времени.

EXPLANATIONS OF PLATES

Pl. I

Mustela pliocaenica n. sp.

- Fig. 1. Skull, *a* side view, *b* bottom view; nat. size.
 Fig. 2. Fragment of mandible; × 2.
 Fig. 3. Fragment of mandible, anterior view; × 4.
 Fig. 4. Fragment of mandible; × 4.
 Fig. 5. Fragment of mandible; × 4.

Mustela plioerminea n. sp.

- Fig. 6. Skull, *a* side view, *b* bottom view; nat. size.

Pl. II

Martes wenzensis n. sp.

- Fig. 1. Mandible (*a*, *b*) detached from specimen fig. 4 of this plate; nat. size.
 Fig. 2. Fragment of half a mandible; × 2.
 Fig. 3. Fragment of skull, anterior view; nat. size.
 Fig. 4. Skull with mandible, side view; nat. size.



1 a



1 b



2



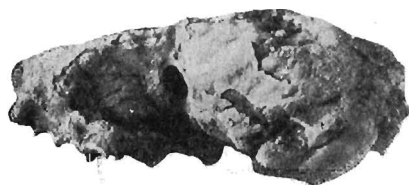
3



4



5



6 a



6 b



1 a



1 b



2



3



4