

ON THE "PACHYGENES" OR "PACHYGNATHES" (THICK-JAWED  
QUATERNARY DEER FROM AFRICA AND ASIA)

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I. HISTORY OF THE DISCOVERY.

Many years ago (1892) A. Pomel (17, 18) described under the name of *Cervus pachygenys*, parts of the skeleton, and chiefly lower jaws, belonging to a fossil Deer from Algeria, this form being related, according to him, to the Pleistocene (Chellean) Fallow Deer, *Dama somonensis* Desm., found near Abbeville (Somme, France). The jaws of this *C. pachygenys* were conspicuous by a striking hypertrophy of their bony substance.

One of the jaws described had been discovered near Bougie (west of the Constantine Department, Algeria) in a cave of the "cap Carbon", almost at sea level, the specimen being associated with remains of several Quaternary Mammals, such as *Rhinoceros subinermis* (*Rh. mercki*), *Buffelus antiquus*, *Ursus libycus* (*U. praeartcos*).

At the same time, two other mandibles, belonging to the same Deer, were found at Berrouaghia (Algiers Department) in the peaty clay of a ravine, north of the town, during work on the foundations of a viaduct. Together with the jaws were collected in this place some fragments of antlers, flattened near the base (like in the reindeer, to some extent, according to Pomel), and flint implements.

Later (1900) another lower jaw belonging to the same animal was observed by E. Ficheur and A. Brives (5) in the sediments filling a cave in the "Bains Remains Quarry", west of Algiers, always in association with the same Quaternary fauna: *Rhinoceros subinermis* (*Rh. Mercki*), *Hippopotamus icosiensis* (*H. amphibius*), *Buffelus antiquus*, *Bos opisthonomus* (*Bos primigenius*). This cave deposit containing Mousterian implements was in connection with a 15 meter raised beach (exactly as in the case of the Bougie cave).

Near Algiers already (in the fossiliferous deposits of the New Pointe Pescade cave, 3 kilometers west from the town) two lower jaws of *Cervus pachygenys* (actually preserved in the University collections) had been found by A. Pomel (19) in the same geological conditions exactly as in the Bains

Remains Quarry along an uplifted sea-shore at 15 meters above sea level, in association with *Elephas atlanticus* (var. of *E. antiquus*), *Rhinoceros subinermis* (*Rh. mercki*), *Hippopotamus icosiensis* (*H. amphibius*), *Buffelus antiquus*, *Bos opisthonomus* (*B. primigenius*).

Some years later (1906), A. Debruge (3) in the course of excavations made in the Ali Bacha cave (west from Bougie) and close to this former place, in a superficial station (in the "irhzer Bir-el-Kanoum" at the foot of the "Pic des Singes"), collected four thick lower jaws of *Cervus pachygenys*, together with bones of *Buffellus antiquus*, *Bos primigenius*, *Ursus sp.*, and numerous flint implements of older Mousterian type. Two of these jaws, given to G. B. M. Flamand, are now preserved in the collections of the Lyons University. Neither Ch. Deperet nor H. G. Stehlin who had the opportunity of examining these specimens, published any of their conclusions; but they were inclined to regard the *C. pachygenys* jaws as pathological.

According to A. Debruge (3), A. Gaudry agreed with Pomel in placing *C. pachygenys* near the genus *Dama*. On the other hand E. L. Trouessart (23) held the same form to be closer to the *C. elaphus*.

In 1913 A. Debruge kindly entrusted me with the material left from his excavations in the Ali Bacha cave (pieces of two upper and two lower jaws of *C. pachygenys*). And at the same time I received from my friend F. Roman, some photographs of the best of the two mandibles kept in the Lyons University. This material struck me at once by the fact that not only the lower jaws, but the upper maxillaries also, and even the palate bones, were extraordinarily thickened.

Shortly before (1912) H. G. Stehlin (22) had given the description of a thick-jawed Cervid, rather closely connected to the giant *Megaceros* of Ireland, but geologically older. This fossil form (*C. Dupuisi*) had been found in the older Post-Pliocene (St.-Priestian) of France (Rosieres, Cher; and St. Prest, Eure-et-Loire), and also in the Middle Pleistocene (Chellean) of Germany (Suessenborn, Mosbach). Previously (1909) the same paleontologist (21) had described, with E. Harle, a variety of *Megaceros*, from the Lower Pleistocene of Val di Chiana (Toscane), conspicuous for the thick, low and rounded shape of the horizontal ramus of the mandible.

Deeply interested by this series of facts which pointed to a common tendency amongst a certain group of deer, towards a thickening of the jaws, I

published a first paper on the question, in 1912 (6). Of course, the gap was rather great between the slight thickening of the jaws described by Stehlin and the abnormal swelling of the *C. pachygenys* jaws. Nevertheless, the large number of the pachygenys specimens already known in those times (ten) had already convinced me that its peculiar features had to be understood as a true specific character, and not as an accidental anomaly.

Being busy at that time (1912) with a general study of the deer of Algeria (7), I happened to meet in the literature a fact overlooked so far by the North African paleontologists. Since 1890 R. Lydekker (15) had described a fossil *Cervus algericus* found 1 meter deep in the Quaternary travertine of Hammam Meskoutin (east of the Constantine department), the fossil remains consisting chiefly of a well preserved upper jaw, kept actually in the British Museum where I had full opportunity for a careful study of the specimen. At first glance, this specimen struck me by its abnormal bony development, and I recognized it as identical with the upper-jaws of *Cervus pachygenys* given to me by Debruge. Even the detail features of the teeth were the same: square shape of the extremely brachyodont crowns, and presence of a strong cingulum forming an accessory column between the two internal pillars of the molars<sup>1</sup>.

As a result of this identification, the geographical area of the "*pachygenys*" Deer proved to be much larger than supposed before: almost 550 kilometers in longitude (from Berrouaghia to Hammam Meskoutin), and more than 130 kilometers in latitude (from the Sea, at Algiers and Bougie, to Berrouaghia).

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1) These characters had been clearly noticed by Lydekker: "No existing species of *Cervus* that has come under my observation has teeth with the large inner cingulum and complex outer surface which characterizes the present specimen. I have indeed found a few isolated teeth of the extinct *C. giganteus* Blumb. (*C. megaceros* Hart.) presenting an inner cingulum approximating to that found in the molars of the jaw under consideration; but such teeth do not show the "pocketed" external surface found in the fossil molars. The nearest approach to the latter feature that I have observed occurs in the molars of some of the larger species of the Rusine groups of the genus *Cervus*. But all the members of that group are widely differentiated from the fossil by their hypsodontism... The teeth of this specimen (*C. algericus*) appear to represent the most complex of brachyodont and selenodont molars yet described" (Lydekker, 15. p. 603).

The same complexity noted by Lydekker on the upper molars of (*C. algericus*) had been observed by Pomel on the lower molars of his *C. pachygenys*; "The external lobes of the second molar," says Pomel, "are deeply separated by a strong interlobar point, connected with a conspicuous cingulum"

On another hand, the name *Cervus algericus* R. Lydekker had the priority over *C. pachygenys* A. Pomel. I indicated this synonymy (8), and, the same year 1914 (10), I suggested the recognition, in the genus *Cervus*, of a subgenus *Megaceroides*, including *C. algericus*,—this name being chosen as emphasizing the close affinity which seemed to connect the thick-jawed Deer from Algeria and the true *Megaceros*. Both *Megaceros* and *Megaceroides* might be regarded, I supposed, as offshoots of the *Rusa* group (an old stock known, from the Pontian, in S. E. Asia).

As for the exact geological age of *C. algericus* (*pachygenys*), I was able to prove (9) that, in all the localities from which this fossil had been reported (Bougie, Algiers, Berrouaghia, Hammam Meskoutine), the deposits were of Upper Pleistocene age (Monastirien), and contained a Middle Palaeolithic industry (Mousterian).

It seems, on the whole, that the very curious thick-jawed Deer of Algeria is a survivor: taken in a Pleistocene environment, this animal represents an isolated form left from the Pliocene ("Indian") fauna of Northern Africa.

## 2. ZOOLOGICAL SIGNIFICANCE.

When, in 1925, I had to write a second edition of my Zoological Geography of the Algerian Deer (12), I took this opportunity for insisting on the large number of "pachygenys" specimens known in Algeria—and consequently on the impossibility of holding all those cases as exceptional and teratological anomalies. And, for the first time following a suggestion of my friend Teilhard, I started a comparison between our Algerian Deer and the thick-jawed fossil Deer recently found in the Lower Pleistocene of China. First discovered by Dr. J. G. Andersson (1), and later by E. Licent and Teilhard (14), those strange Cervids have been chiefly described, so far, by Dr. Zdansky (24, 25, 26). According to Zdansky, a "pachyostosis" of the mandible would occur, during the Pleistocene times, in two widely different types of Deer; *Cervus* (*Elaphus*) *canadensis*, var. *Mongoliae* Gaudry, and *Rusa pachygnathus* Zdansky, the latter being identical with the *Cervus* (*Sika*) *hortulorum* described by Matsumoto from Shantung (16)<sup>1</sup>.

1) Since that time, further discoveries, made in Chou Kou Tien, have given clear evidence that the thick-jawed Deer of China belong to a perfectly definite zoological type, probably connected with the *Megaceros* group. These results support entirely the position held by the author of the present paper.

In the meantime, my friend A. Debruge had re-opened (for the Logan Museum of Beloit, Wisconsin) his excavations in the "station en plein air" of Ali Bacha, near Bougie. Happening to visit the place, I witnessed the find of several jaws belonging to the "pachygenys" deer, a regular heap of similarly swollen mandibles being the result of the excavation work. There was the absolute proof of the specific individuality of the Deer of Bougie (13).

Quite recently, in the course of their synthetic study of the Pleistocene fauna from Algeria, A. Romer (20) and C. Arambourg (2) have entirely accepted my opinion in this matter. We may add that the last finds made by A. Debruge in Ali Bacha prove that *C. algericus* was still living, near Bougie, during the late Paleolithic times (that is in the beginning of the neo-Pleistocene<sup>1</sup>).

Of course, some differences seem to exist (chiefly in the shape of the section of the mandible) between the "pachygenys" Deer from Africa and Asia.

Nevertheless, the almost contemporaneous appearance of thick-jawed Deer in Algeria and China raises an interesting problem of palaeobiology (*I do not say* "of paleopathology"). Here is a strange hypertrophy of the bones, chiefly bearing on the lower jaws, but clearly extended to the upper maxillaries, and (at least for the Chinese form) to the other parts of the face and of the skull. How to explain this common feature?

We may observe here that the osteological anomalies presented by the Pleistocene Deer occur in the very times during which a decided tendency towards gigantic forms is found, everywhere in the world, amongst the most different groups of Mammals, from the Proboscidiens, Hippopotami or Carnivora of our countries, up to the South American Edentata, the Madagascarian Lemurs and the Marsupials of Australia.

I feel inclined for my part, to include the characteristic swelling of the jaws of the "pachygenys" deer in the same series as the other bony hypertrophies to which so many extraordinary developments of the skeleton are due, in the case of the Pleistocene Mammals. In this way, the hyper-activity of the bony tissue met in the thick-jawed Deer would parallel to some extent,

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1) A. Romer is only wrong (20, p. 108) when he quotes *C. algericus* from La Mouillah. The Deer found in this locality is, according to A. Barbin, "The same as the Deer found by Debruge in Constantine" (not in Bougie!). But the Deer remains collected by Debruge in Constantine have been studied by myself: they belong to *C. elaphus barbarus*.

the evolution of the late Mesozoic Dinosaurians (11). And since any hypertrophic growth of the skeleton has to be understood as an indication of degeneration, we could perhaps search in this line the reason explaining (just as in the case of the Dinosaurian, again) the sudden disappearance of the *Megaceros* and *Megaceroides* groups.<sup>(1)</sup>

However it may be explained the biological (and not at all geographical) fact stands before us is that in two countries so widely distant as China and Algeria, two allied groups of Deer have exhibited at the same time the same close association of zoological characters: hypertrophy of the bones—swarming of the individuals—and close approach to the extinction of the group.

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(1) In some respects (intensive proliferation of the elements, Localization of the "disease" in special periods or geographical areas, etc.) a comparison might be tried, perhaps, between these cases of hypertrophy met in the zoological groups and the evolution of cancer, as it occurs in individual organisms.

REFERENCES

1. Andersson, J. G. 1923 Essays on the Cenozoic of Northern China. Mem.-Geol. China, A. 3, p. 116.
2. Arambourg, C. 1929 Les Mammifères quaternaires de l'Algérie. Bull. Soc. Hist. Nat. Afrique du Nord, tome XX, Alger, No. 3, Mars, p. 73-74.
3. Debruge, A. 1906 La station quaternaire Ali Bacha à Bougie. Recueil Notes Mem. Soc. Archeol., Constantine, 4e serie, tome IX (XL de la serie complete), (1907) p. 150, 156.
4. Dupuis, C. 1909 Une nouvelle faune de Mammifères des phosphoriques du Quercy. Bull. Soc. Geol. France, 1e ser., tome IX, Paris, p. 43.
5. Flicheur, E. et A. Brives 1900 Sur la découverte d'une caverne à ossements à la carrière des Baines Romains à l'Ouest d'Alger. Compt. rend. Acad. Sc., Paris, tome CXXX, 28 Mai, p. 1485-1487.
6. Joleaud, L. 1912 Sur la position Systématique de *Cervus pachygenys* Pomel du Quaternaire algérien. Bull. Soc. Geol. France, 4e ser., tome XII, Paris, p. 468-571.
7. " 1912 Etudes de Géographie zoologique sur la Berbérie, Les Ruminants, I. Les Cervidés. Rev. Africaine, Alger, tome LVI, p. 496-498.
8. " 1914 Sur la *Cervus (Megaceroides) algericus* Lydekker, 1890. Compt. rend. Soc. Biol., Paris, tome LXXVI, 21 Avril, p. 737-738.
9. " 1914 Notice géologique sur Hammam Meskoutin (Algérie) Bull. Soc. Géol. France, 4e sér., tome XIV, Paris, (1916) p. 434.
10. " 1915 *Cervus (Megaceroides) algericus* Lydekker, 1890 Rec. Soc. Archéol., Constantine, 5e sér., tome VI (tome XLIX de la collection) Constantine (1916) p. 1-67, 3 tabl., 4 pl.
11. " 1921 Les Reptiles fossiles, Ass. Franc. Avanc. Sc., tome XLV, Reims, (1922), p. 66.

12. Joleaud, L. 1925 Études de Géographie zoologique sur la Berberie, Les Ruminants. I. Les Cervicornes (2e édit.) Vol. jubilaire de Corjanovic Kramberger, publié par la Soc. Sc. Nat. Croatica, Zagreb, (1926), p. 293-306, fig. 5-6, pl. X.
13. .. 1928 Les Cerfs quaternaires à machoires épaisses d'Afrique et d'Asie. Rev. Scient., LXVI, Paris, No. 17, 8 Septembre, p. 542, fig. 246. Titres et travaux scientifiques, Paris, 1927, in-8, p. 72, fig. 13-14.
14. Licent, E. et Teilhard de Chardin. 1925 Le Paleolithique de la Chine, l'anthropologie XXXV Paris, p. 204, No. 1 et Archiv. Institut Paleont Humaine, IV, 1928 (en collaboration avec M. Boule et H. Breuil)
15. Lydekker, R. 1890 On a Cervine Jaw from Algeria. Proc. Zool. Soc., London, p. 602-604.
16. Matsumoto, H. 1926 On some fossil Cervids from Shantung, China. Sc. Rep. Tôhoku Imp. Univ., 2e ser (Geology) Vol. X, No. 2, p. 31, 37, pl. XIII, fig. 1-8, pl. XIV, fig. 1-10, pl. XV, fig. 1-4.
17. Pomel, A. 1892 Sur deux Ruminants de l'époque neolithique en Algerie: *Cervus pachygenys*, *Antilope Maupasi*. Compt. rend. Acad. Sc., Paris, tome CXV, p. 213-216 (sans figure).
18. .. 1893 Caméliens et Cervidés, Matér. Carte Geol. Algerie, Paleont., Monogr., Alger, in-4, p. 36-43, pl. VII, fig. 1-5, pl. VIII, fig. 1-4.
19. .. 1894 Sur une nouvelle grotte ossifère decouverte à la Pointe Pescade, à l'Ouest d'Alger. Compt. rend. Acad. Sc., Paris, tome CXIX, 10 Decembre, p. 986.
20. Romet, A. 1928 Pleistocene Mammals of Algeria, Fauna of the Paleolithic Station of Mechta el Arbi in a Contribution to the Study of Prehistoric Man in Algeria, North Africa, by A. W. Pond, Logan Museum Bulletin, Vol. I, No. 2 (Beloit College Bulletin, vol. XXVI, No. 5) April, Beloit (Wisconsin), p. 108-9, 150.



21. Stehlin, H. G. 1909 Une nouvelle faune de Mammifères des Phosphorites du Quercy. Bull. Soc. Géol. de France, 4e ser., tome IX, 1909, p. 43.
22. „ 1912 Les sables de Rosières, près de Saint-Florent (Cher) II, Paléontologie. Bull. Soc. Geol. France, 4e ser., tome XII, Paris, p. 202-203, pl. V, Fig. 10.
23. Trouessart, E. L. 1891 Catalogus Mammalium tam viventium quam fossilium, Berlin, p. 881.
24. Zdansky, O. 1925 Fossile Hirsche Chinas, Palaeont. Sinica, Ser. C, Vol. II, p. 73-76, pl. XIV, fig. 2 (*Rusa Pachygnathus* Zdansky et *Cervus canadensis Mongoliae* Gaudry).
25. „ 1927 Weitere Bemerkungen über fossile Cerviden aus China. Paleont. Sinica. ser. C. Vol. V. Fasc. I, p. 13-15, fig. 5 (*Rusa Pachygnathus*).
26. „ 1928 Die Säugetiere der Quatärfauna von Chou K'ou Tien, Paleont. Sinica, Ser. C, Vol. V. fasc. 4, p. 106, pl. XII, fig. 1-12 (*Cervus canadensis mongoliae*).