A NOTE ON THE UNSATISFACTORY NATURE OF THE HORSE SERIES OF FOSSILS AS EVIDENCE FOR EVOLUTION*

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Professor H. Nilsson assembled powerful arguments concerning the artificial character of the so-called 'family tree" of horse evolution. Nilsson's statements have been translated, discussed, and illustrated in this article. On close analysis, the collection of "horse" remains is not a continuum of well-integrated fossils but an assemblage of separate groups varying widely in size and other criteria. ***Hyracotherium. (Eohippus),*** *for example, was very likely not a horse but an animal quite like the contemporary* ***Hyrax*** *or Damans.* ***Mesohippus*** *and* ***Parahippus*** *remains represent a separate group that is not related to* ***Hyracotherium*** *or to* ***Equus,*** *the modern horse. The "family tree" of the horse is artificial because it has been constructed of non-equivalent parts which are unrelated. Evidence since Nilsson's study is also reviewed. It is concluded that the horse family is unique and separate and that the evidence can, without any, weighting, be fitted to the case for special creation.*

Introduction

Construction of family trees to show possible connecting links between various species and larger groups of the animal kingdom is widely used in the presentation of the case for evolution. It is a particularly subtle form of presentation, since it is often assumed by the reader that the drawing itself is evidence for the connecting links which the drawing forcefully suggests (See Figure 1).

Two recent cases† come readily to mind in which, with absolutely *no evidence* to support their case, bodies of learned men have spent prodigious labor simply to show that a paleobiological tree may be drawn for their chosen group of animals. This of itself is not objectionable, but the unwary are easily ensnared intellectually by the erudition of the case to believing that such was *in fact* the way the development of that group of animals proceeded *in nature*—indeed the case is inevitably concluded in that manner by the authors of the scheme.

If one now turns to, allegedly, the most powerful evidence in support of the case for evolution (i.e. transformation across the species), one will often be invited to consider the case for the alleged evolution of the horse. That this is indeed so, I quote from a recent paper by Professor F. H. T. Rhodes[1]

> at a lower taxonomic level, between genera, for example, we also have a substantial number of transitional sequences. One of the best of all is the sequence of horses linking the whippet-sized, primitive, Eocene form Hyracotherium with the living horse. This was one of the first fossil sequences ever described. It was first described by Kovalevsky in 1874, and it was later amplified by Marsh, and interpreted by Huxley. The beautiful gradational sequence which these fossils show is now so well described (e.g. Simpson*, 1951) that we need only summarise its major features. These involved the increase in body size, the increase in size and change in the shape of the skull, changes in the teeth, involving the premolarisation of the molars, and the deepening of the teeth from low crowned to high crowned, together with the infilling of the depressions in the upper surfaces with cement. With these were associated changes in the limbs, with the gradual reduction in the number of toes, and in the whole change in construction of the limbs associated with the change in posture from pad-footed to spring-footed. Now this series is incontravertible. It provides clear evidence of the transition of one genus to another over a period of something like seventy million years.
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> Secondly, at all taxonomic levels, there are now, in a limited number of cases, examples of continuity. Let us first of all take high taxonomic levels. Here we have, especially in the vertebrates, remarkable transitional

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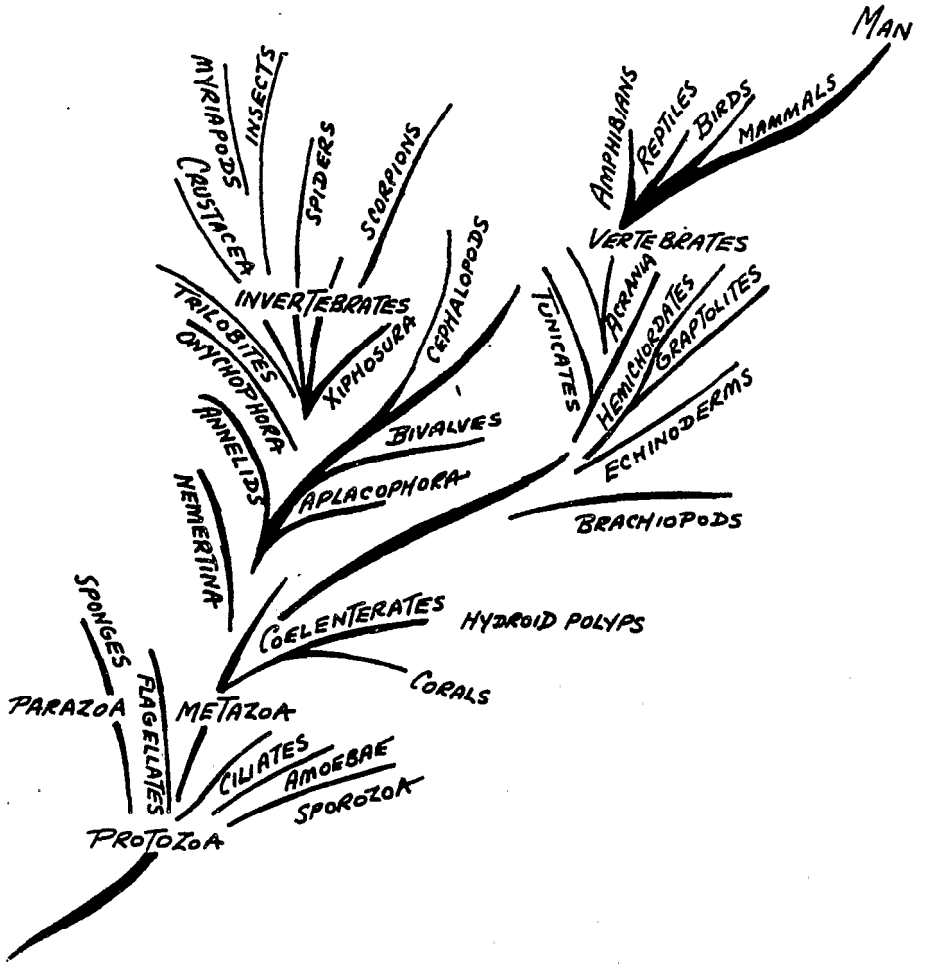
†"Genesis of the Hymenoptera and the Phases of their Evolution," S. I. Malyshev London 1969 (63/-) "The Cnidaria and their Evolution." Symposia of the Zoological Society, London, No. 16. Edited by W. J. Rees. London, 1968. (1051-).

*Simpson, G. G., (1951), Horses, Oxford University Press, New York.



ANIMAL PHYLOGENY,
after de Beer

Figure 1. From "Fossil Man, a Reappraisal of the Evidence," by F. W. Cousins, 1961, published by The Evolution Protest Movement, Havant, Hampshire, England.

This phylogenetic tree is typical of the way evolutionists present their case. It is redrawn by the author from deBeer's *Atlas of Evolution,* Nelson, 1964, p. 155. In presenting it deBeer says: "Animals evolved from Protophyta by loss of chlorophyll and acquisition of holozoic nutrition. From Protozoa, Parazoa produced sponges, and Metazoa gave rise to two main groups leading to the highest invertebrates and to vertebrates respectively." There is no evidence of such an evolutionary chain. There is no evidence at the outset of the chain that a single protozoan has changed into a single metazoan[6]. The author found no difficulty in drawing this phylogenetic tree, but the lines, the slope of the lines, the thickness of the lines, the graceful upward curve of the lines should not be mistaken for evidence of actual genealogical links. (from Heywood, V. H., and McNeill, J. Phenetic and Phylogenetic Classification. Nature, Vol. 203, No. 4951, pp. 1220-1224, Sept. 19, 1964)

forms between various classes. Between the crossopterygian fish and the amphibia, we have the ichthyostegids, part fish, part amphibia, known from the Upper Devonian or Lower Mississippian of Greenland. The early Upper Devonian Elpistostege is intermediate between ichthyostegids and osteolepids (Westoll, 1938, 1943, 1958). Between birds and reptiles, we have the renowned Archaeopteryx.

and from Dr. G. A. Kerkut's book,[2]

It would not be fitting in discussing the implications of Evolution to leave the evolution of the horse out of the discussion. The evolution of the horse provides one of the keystones in the teaching of evolutionary doctrine, though the actual story depends to a large extent upon who is telling it and when the story is being told.

I will now proceed to show that the evolution-

ists' view concerning the horse as valid evidence for transformation is open to serious doubt. I hope to show further that the general presentation of their arguments cannot carry the conviction which is universally granted to it by those unskilled in biology, who, not unnaturally, accept that biologists view the evidence with dispassion, as far as that is even possible, in the presentation of the controversial case which they espouse.

I turn to the powerful arguments mounted by the late Professor H. Nilsson in his *Synthetische Artbildung*[3]. Unfortunately, this encyclopaedic work is expensive and rare; further, it is written in the German language and thereby not openly accessible to readers who are not German scholars. I am much indebted therefore to my friend, Mr. C. H. Greenstreet, for having made, at my request, a translation of the relevant portion of *Synthethische Artbildung,* on the horse which it is my pleasure to present for the first time in English. I am also indebted to the kindness of the publishers of *Synthetische Artbildung,* Messrs. C. W. K. Gleerup of Öresundsvägen, Lund (Sweden), for permission to publish this translation and thereby give these important ideas to a wider audience. The pictures, footnotes, the introduction, conclusion, and the extensive bibliography presented here are my contribution to this study and they form no part of the original pieces by Professor Nilsson.

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The Horse

How innumerable are the family trees that only hold together because "connecting lines on paper" form the intermediate bridges! Without these, the construction of a family tree would be almost impossible. For it is particularly the connecting corners that in reality are almost always lacking. One can easily satisfy oneself of this everywhere in the relevant literature.

Here someone interrupts: "But no! even if all the other family trees are demolished, *one* nevertheless remains, paleobiologically sound, continuously and consequentially constructed, established through the whole Cenozoic", the family tree of the horse."**

It is true that people have spoken of the evolutionary "parade horse," proudly calling attention on the one hand to the completeness of a long transformational series, while on the other hand contemptuously emphasizing the nature of the series as a rather detached piece of bravura.

The enthusiasts are many. One can still see in the latest reviews of evolution, which are no longer written by natural philosophers or pure morphologists, how the family tree of the horse is compared to a true *experimentum crucis.* It is set out thus in the book *The Cause of Evolution* by the geneticist and biostatistician J. B. S. Haldane[4] (and in the recent *Atlas of Evolution* by the pre-eminent Darwinian, Sir Gavin deBeer[5], see Figure 2).

We must at all events look somewhat more closely to see how deeply the credibility of their evolutionary series is anchored, despite the fact that the biostatistician readily accepts it. For it is certainly clear that neither the number of the forms nor the possibility of arranging them in a series is proof on its own.

It is very instructive to remind oneself how the oldest, Eocene fossils of this series were first interpreted. Davies[6] gives a good survey of this. He is so far from entertaining anti-evolutionary thoughts that he wrote his book rather as a polemic against the real English critic with respect to the theory of evolution, Dewar[7].

Owens, the discoverer of the first eozoic* fossil in the London clay, explained the skull fragment as a new ungulate genus, which he named *Hyracotherium.* The name refers to the Genus *Hyrax,* the "Klippschliefer" or "Daman"**, which is today native to the mountains of Africa and Western Asia. Owen did not want to assert that *Hyracotherium* resembles the "Klippschliefer" more than any other genus of pachyderm, only that the size of the animal appeared to come closest to that genus. Its binary name was *Hyracotherium leporinum:* by the specific name he wanted to call attention to certain features of the skull that seemed to him to resemble the rodents. When later he was able to describe an almost complete skull and parts of the limbs, he did not dare to identify the two forms, but named the new form *Pholophus vuliapeps,* that is to say a type with a fox's head but multiple back teeth as in the hoofed animals. This form has been included by the later paleontologists in the genus *Hyracotherium.*

As will be at once seen from this state of affairs, Owen found an indication of correspondence of

*Cenozoic-the age of the mammals, said to extend from about 60 million years to the present.

**The idea of evolution in the Horse began with Kowalewskii working with European and Asian forma; see Kowalewskii, V. D. (1842), "Sur l'Amchiterium aurelianeuse et sur l'histoire paleontologique des Chevaux," Mem. Acad. Imp. Sci. St. Pet. 7, Vol. 20.

*Eozoic—a term suggested for the Pre-Cambrian system, but little used. It means the "dawn of life."

**Daman—from the Arabic name *Daman isroil,* sheep or lamb of Israel (It has no resemblance to a sheep). The Syrian rock-badger or "cony" of Scripture *(Hyrax syriacus)* is the name also extended to the species found at the Cape, *Hyrax capensis,* (the Saphan of the Scriptures).

Figure 2. The evolution of the horse according to deBeer, *Atlas of Evolution,* 1964.

characteristics of *Hyracotherium* with several orders, including that of the ungulates. But he made no mention of a relationship with the equids.

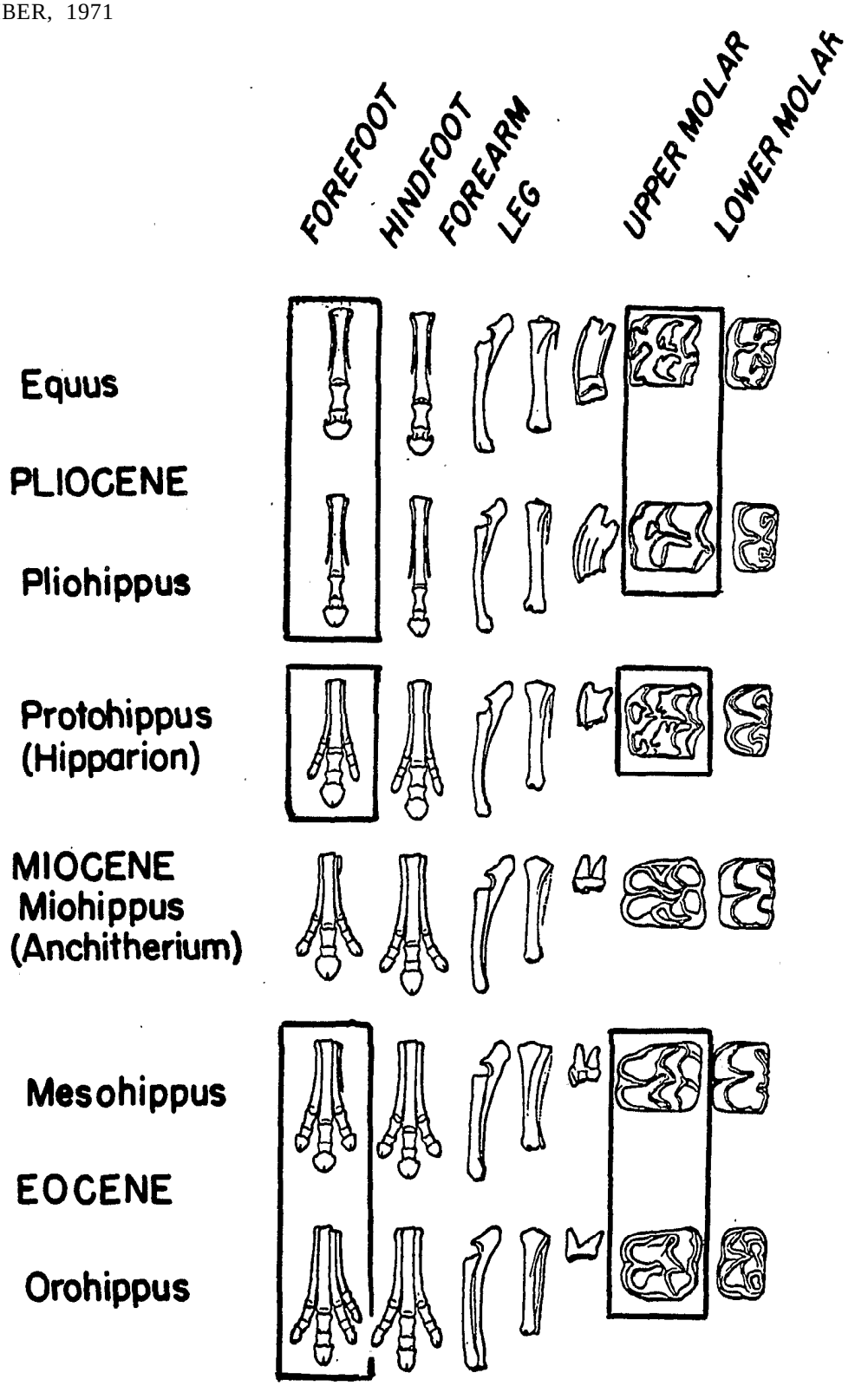
When, toward the end of the nineteenth century, still further finds of *Hyacotherium* - like fossils had been made, it was found that these approached other forms, including the tapirs and rhinoceroses. The Eozoic hoofed animals of the perissodactyl* type were therefore collected into one family, Lophiodontidae.**

Very early on, however, already in the middle of the seventieth year of the previous century, the roots of a family tree of the present day horse were produced from this material. The finds of the American paleontologist Marsh and others were schematically exhibited for a lecture given by Thomas H. Huxley in New York, where there were seen in increasing order and in series the front and back feet, the forearms, the rear leg bone, the tooth types, and the surfaces of the back teeth. (The author has reproduced the picture in Figure 3.) From this work the ancestry of the horse was at once *complete.* It was published by Marsh in 1879 and then found quick entry into many publications and text books; indeed it is still seen today, in full or in part, almost unchanged.

Since the, more than 70 years have passed and a quantity of further finds have been made

*Perissodactyla Odd-Toed Ungulates—an order of mammals containing Horses, tapirs, and rhinoceros.

**Lophiodon—a fossil mammal of the Eocene Period related to the tapirs.



ALLEGED GENEALOGY OF THE HORSE

Figure 3. Alleged genealogy of the horse (after Marsh, Polydactyl horses, *American Journal of Science,* 1879, p. 505). The parts in the black boxes are the parts used by deBeer to make his case in 1964. See Figure 2.

The continuity of the series has in certain cases become more intimate. Osborn, the outstanding expert on fossil horses, which have so greatly increased in number, thus also gained so strong an impression of the gradual transitions that he regarded the whole process of "becoming horse" as a displacement of the proportions of characteristics, as a pure case of transformism in the Darwinian sense. After discussion of the horse series he summarized his opinion in the following characteristic statement (Osborn[9], p. 268):

> The above examples illustrate the general fact that *change of proportion* make up the larger part of mammalian evolution and adaptation. The gain and loss of parts, which is so conspicuous a phenomenon in heredity as studied from the Mendelian standpoint, is a comparatively rare phenomenon. The changes of proportion are brought about through the greater or less velocity of single characters and of groups of characters; for example, the transformation of the four-toed horse of the base of the lower Eocene into the three-toed embryo of the modern horse is brought about by the acceleration of the central digit and the retardation of the side digits. This process is so gradual that it required 1,000,000 years to accomplish the reduction of the fifth digit, which left the originally tetradactyl horse in the tridactyl stage; and it has required 2,000,000 years more to complete the retardation of the second and fourth digits, which are still retained in the chromatin and develop side by side with the third digit for many months during the early intra-uterine life of the horse.

According to Osborn the little toe also required 1,000,000 years to be continuously reduced away. He reckoned, however, with only 3,000,000 years for the whole Cenozoic Period. Now this period is estimated to be at least 30,000,000 years.* The reduction of a given toe thus required 10,000,000.** The thought is not a little ingenuous.†

If one asks oneself: Is the continuity then really so marked as the series of *Hippi* (the names too are continuous) set up as long ago as 1879 indicate?

We ask the best European expert on fossil horses, Abel[10], who is also familiar with the American finds. In his *Palaeobiology and Family History* which is thus 50 years more recent than Marsh's treatise, the horse problem is dealt with from the modern point of view, so that the work can be said to be representative of the present position of the relevant research.

In Figure 4 I have represented the family tree of the equids, after page 288 of Abel, in a comprehensive scheme, to which are added the geological stages and formations for both Europe and North America. As one sees, a hypothetical family tree is also made very prominent here. Many forms have been added, but they branch off from the main stem and disappear. Here too everything seems to proceed in unbroken and undisturbed temporal series. A parade horse in truth steps forward, perfect, out of the darkness.

However, when one carefully studies Abel's portrayal of the genesis of the horse, one is not a little surprised at several comments.

Attention is still drawn, as before, to the complete continuity of the family tree of *Equus*, so that one at once gets the impression that the development has proceeded quite undisturbed. In this case one does not expect discontinuities, either biological or geological. However, Abel speaks of "Old horses" and "New horses." The latter further form two clearly independent groups: that of small and more primitive new horses and that of the large equus-like. The last group begins with *Merychippus*. And the appearance of this genus is depicted as follows:

> However, the horse series itself shows very clearly that the phylogenetic development of a tightly-closed stem took place in quiet, uniform, one can say always uniform forms, and that then, in the series mentioned here, which it is true does not include all genera of the North-American horse, an era of much faster transformation set in that appeared almost stormy. This era is characterized by the origin of the *Merychippus* type[10].

And in another place he asserted

> that at the same time as in North America there occurred the formation from *Merychippus* of numerous new stems occurred in almost explosive form (Middle and upper miocene), there also took place in the case of the whales the origin of the two families of the physeritides and the ziphuds[10].

*It has increased twofold from c. 1930. It is now 60,000,000 years not 30,000,000. The argument of Nilsson is thereby greatly reinforced.

**This figure would now be 20,000,000 years.

†Editor's Note: It is obvious to the reader that Nilsson placed some faith in the supposed vast ages of the uniformitarian geologic column, as did Douglas Dewar and certain other creationists of a previous generation. Creation Research Society stands unalterably opposed to the long-ages hypothesis and in favor of a relatively recent creation (although not necessarily 4004 B.C.). Yet it is of interest, as author Frank Cousins points out, that the evidence favoring the creation of horses is so clear that it cannot be denied whatever one holds about the so-called "science" of stratigraphy or the supposed vast epochs of geologic time. For numerous papers concerning evidence from many fields favoring a "relatively young earth," consult previous issues of C. R. S. *Quarterly* — articles by Clifford Burdick, Henry Morris, Walter Lammerts, Thomas Barnes, Robert Whitelaw, Melvin Cook, R. H. Brown, and many others.

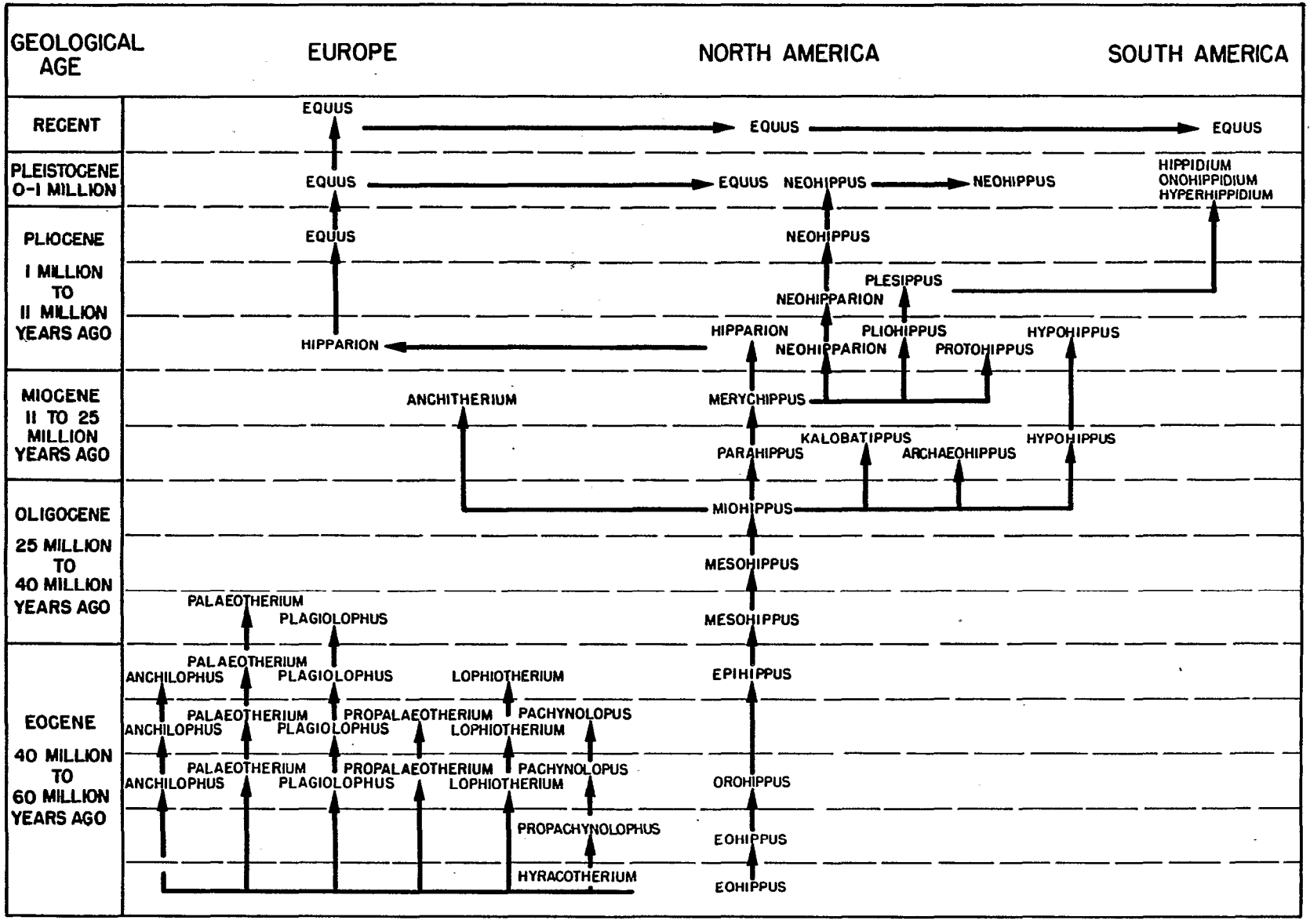


Figure 4. The family history of horses, after O. Abel. (Slightly simplified)

A "stormy," "explosive" transformation of the horse tree, we can thus also say an emicative process, thus took place during the latter half of the Miocene. This applies both with regard to the degree of change in character and the production of new forms. "I have the impression," Abel[10] also said, "that the biggest jump shown by the horse, apart from the gap between *Mesohippus* and *Epihippus*, lies in the formation of the *Mercychippus.*"

The last statement also refers to a new break in the skeleton of the tree. I have just mentioned that Abel distinguished between old and new horses. *Epihippus* is the last of the old horses, while *Mesohippus* is the first of the new horses. Between these we have a very considerable jump. For the first were small animals, only as big as foxes, with four-toed forefeet; only with the latter did the large, three-toed type first occur.

Abel's attempt to reconstruct the biology and environment of these obviously very peculiar and very little horse-like "old horses" is of very great interest. This brings us back to Owen's *Hyracotherium.* This European genus is named *Eohippus* in North America. For their being synonymous Davies put forward the following argument, which is certainly worth reading:

> I here assume the generic identity of the *Hyracotherium* with *Eohippus*, as seems the inevitable conclusion from Forster Cooper's recent revision of the English fossils (1932). Technically, this means that the name *Eohippus* must be abandoned in favour of the prior name *Hyracotherium;* but in writing for the general reader I feel justified in using the highly appropriate name *Eohippus* (dawn horse) instead of the misleading *Hyracotherium*[11].

Davies is thus inclined to suspend the priority rule of nomenclature, at least for the layman so as not to shake their evolutionary convictions by a misleading name for the proposed starting forms of the family tree.

Perhaps, however, the basis of Davies' rejection of the name *Hyracotherium* is not only the avoidance of a false etymological meaning. Indeed the first supposed ancestors are, as mentioned above, very little horselike both morphologically and in habitat. This was just as little the case with regard to their manner of life and whole ecological situation, as Abel, with the support of several investigators, imagined these to be. He depicted *Hyracotherium* and its environment very vigorously in the following manner:

> The oldest horses were not steppe-dwellers, but were small animals, which in looks and in their whole outward appearance must have presented the picture much more of a Chilean (Puduhirsch) deer or a Javanese deer *(Kantschils tragulus)* than that of a dwarf recent horse. Matthew has drawn attention to the fact that these oldest horses were thicket-dwellers, which rescued themselves in the case of urgent danger not by speedy flight but by a jump into the protective thickets, and which mainly lived on soft leaves and succulent vegetables, and this view is thoroughly to be endorsed. Prolonged running on hard steppes and browsing on the hard grassy plants of the steppes would not have been possible for these little old horses[12].

Why have these eocene animals become true horses, since they remind one so little both morphologically and biologically of horses? Are there today no animals that both look and live like these? Yes. It seems to me quite odd that no one has thought of the genus of animals from which the current name of Owens, *Hyracotherium,* was formed, namely *Hyrax.* It already shows in its incomplete material hyracoid traits, but no equine ones. And the former have become progressively more striking as the type has been made more complete through new finds.

Hyrax is a quite remarkable animal in the present-day fauna, which fits into no order since it imitates many orders. Mostly it is placed in the genus of hoofed animals, but it has also been placed amongst the insectivores and the rats; indeed, people have also sought to find traits of the elephants, marsupials and edentates.* The truth is that we find here just as peculiar a recent combination form as the South American hoatzin was among the now living birds. Owen has already found *exactly the same* with regard to *Hyracotherium.*

Hyrax, like *Hyracotherium,* is a small animal, about the size of a rabbit or fox. Like these, *Hyrax* has four toes on the fore-limbs and three on the hind limbs, a quite striking similarity. The back teeth of the two genera exhibit many similarities and resemble those of the rhinoceri more than those of the horse. It must be added that *Hyrax* is a very shy animal that usually lives on mountain ledges and in thickets of the highlands, and when it chances to come out of the edges of the woodlands into grassy plains it takes fright extraordinarily easily and quickly disappears back into the thickets. Its way of life and name thus remind one as exactly as possible of those postulated for *Hyracotherium.*

Thus *Hyracotherium* does not resemble the present day horse in any respect, but on the other hand is quite *amazingly similar* to the present

*Edentata—An order of mammalia characterized by the absence of front teeth, (the ant eater, armadillo, sloth, etc.).

day damans. One can also express this state of affairs by saying that *Eocene "'horses" are still living today.* Naturally these cannot be regarded as horses, for this would mean that evolution is standing quite still. Since the rest fit into none of the recent orders, one speaks of them, to save ridicule, as little as possible. They would in fact only fit into the Eocene order *Lophiodontidae,* but this would be too absurd.

Hyracotherium is an Eocene genus. Beside it several closely connected European genera are placed and, as is seen from Figure 4, the genera *Propachynolophus* and *Pachynolophus* follow in the middle and upper Eocene, while *Hyracotherium* disappears in the lower Eocene. Thus a beautiful transgressive development appears to take place here. A revision of the European old horses by Forster Cooper[13] has, however, shown that those genera cannot be distinguished. Thus *Hyracotherium* lived during the whole Eocene and the development stood still. The names alone appear to have developed.

One still meets with the opinion that the horses became successively bigger. This is of course correct insofar as *Equus* is bigger than *Hyracotherium,* just as the horse of the present-day fauna is bigger than the daman, and between the two extremes there are in both cases several intermediate forms of ungulates. Now people were so firmly convinced of the increase in the size of horses in the geological strata that in some cases the ages of the strata have even been determined by the size-type of the horse-remains found therein.* As Cooper pointed out, there is no strong parallelism in this respect. *Eohippus* which appeared in the lowest Eocene, is the largest form of the Eocene horses. All middle and upper-Eocene forms are smaller. Only in the Oligocene did there come, with *Mesohippus,* a sudden significant increase in size. Here there appeared a type of horse that was also changed in many respects: a type of small new horse, which is about as big as a sheep.

With this there comes to light the first lacuna in the hypothetical family tree of our horse. In these animals of genera *Mesohippus* and *Parahippus,* both the front and hind feet are three-toed, and they differ from the old horses in many other characteristics, into which we cannot go here. Their way of life was also new. Thus Abel[14] thought that they were steppe-animals which inhabited flood-plains formed during the Oligocene. A type both morphologically and biologically new occurred with the Oligocene and lived until the lower miocene. Then this too disappeared.

Thereafter the real horse, the new horse, first appeared. The breaking of a hypothetical evolution series can hardly be more definite than with the appearance of this type. One-toedness dominated, although quite clear rudiments of two side-toes may occur. But an important deviant type occurred with respect to the teeth and the nature of the dentition. The teeth of the horse are very high, prismatic, not rooted, (?enamel-folded) and richly covered in cement. In this respect they are structures unique in the whole fauna. Animals with teeth first occur in the upper Miocene. These "hypsodental ungulates" appear all at once, without intermediate stages. They are even naturally variable, just like other groups, since they at once appeared in full bloom. With *Merychippus* and *Hipparion* there is a rich group of Equus-like forms which are all separated from the former "brachydontal" groups, by a gaping evolutionary gap. These former groups have died out, totally eliminated from the search. Here one cannot speak of evolution. The complete extinction of an ungulate fauna and the sudden appearance of another—and this at once richly differentiated, which I have described above as an emicative occurrence—is rather a creative fact.

The family tree of the horse is beautiful and continuous only in the textbooks. In the reality provided by the results of research it is put together from three parts, of which only the last can be described as including horses. The forms of the first part are just as much little horses as the present-day damans are horses. *The construction of the whole Cenozoic family tree of the horse is therefore a very artificial one, since it is put together from non-equivalent parts, and cannot therefore be a continuous transformation series.* Its evolutionary value is therefore made totally untenable through the new research.

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Conclusion

Since Nilsson's work on the horse, reported here, there is no new evidence known to me which leads me to wish to change the conclusions he reached, His work was closed before 1954, but Dr. G. A. Kerkut of the Department of Physiology and Biochemistry at the University of Southampton, writing in 1960, and reprinting his researches in 1965 (See reference 2) appeals forcefully for biologists to put their house in order regarding the basic information on the horse and the fossils *per se.*

He points out that the basic information on the known fossils has not been given since 1926 and 1930 and that it is difficult to find out how many specimens of a given genus are available for study. There are, he thinks, probably 100 mounted skeletons of fossil horses in the world. There are no mounted skeletons of *Eohippus,*

*This is a good example of the circular reasoning of the "science" of stratigraphy.

Archaeohippus, Megahippus, Stylohipparion, Nannippus, Calippus, Onohippidium or *Parahippies* and none in the USA of *Anchitherium or Hipparion.*

He then draws attention to the genera of the horse family. Kowalewski in 1874 knew of three; Lull in 1917 described 15, Simpson listed 26 in 1945, and Kerkut wonders how valid these genera really are. The Eocene is now dated at 60 million years and no one yet knows how to place the alleged 26 genera in relation to themselves within this vast time period which is open to severe criticisms on the dating methods used.

We still have a few of the Przewalski horse extant. The Prague Zoo keep the records of this animal believed to be the horse pictured in the Lascaux Caves (15,000 years ago?). A herd of eight was sighted in Mongolia in 1966. Dr. R. M. Stecher in a paper in 1968 in *Acta Zoologica et Pathologica* gives results of vertebrate counts from the spines of 61 skeletons of the Przewalski horse and he compares these with similar counts from four other horses—the domestic horse, donkey *(E. asinus),* mule *(E. caballus* and *E. asinus)* and hemione *(E. hemionus).* He also attempts to relate these figures to the number of pairs of chromosomes in a cell of each horse.

Przewalski horses have the longest thoracic segment in the spine, the next to the longest lumbar segment, the shortest sacral segment, and the next to the smallest number of latral joints in the lumbar spine. It has also the highest chromosome count—66 pairs against 64 of the domestic horse, 63 of the mule, 62 of the donkey, and 54 in the hemione.

Dr. Stecher then makes the *completely invalid* assumption that this suggests evolution within the horse since the horse spine has changed and these changes are correlated with the chromosome count. It suggests, to my mind, nothing of the kind; it shows conclusively that the spines and chromosome counts are different in different animals and absolutely no evolutionary argument can legitimately be imported into his researches. He should know that we classify everything by constitutional differences and a study of the morphology of the horse cannot be used to decide on the reasons for the constitutional differences.

Horse evolution in 1969 is still a matter of conjecture and not based on clear and unassailable evidence. The horse family is unique and separate and the evidence can, without any weighting, be fitted to the case for special creation.

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