**NOMENCLATURAL NOTES ON**

**THE PLEISTOCENE HORSE FROM SAN JOSECITO CAVE,**

**SOUTHERN NUEVO LEON, MEXICO**

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ABSTRACT.-- The San Josecito Cave (Nuevo León, México) fossil horse Equus conversidens leoni has been dealt with widely for the past 50 years without the actual naming of the holotype. However, the late Dr. Chester Stock had prepared a manuscript with the formal naming of the species, including designation of a type specimen. That specimen is currently in the Types Case of the Section of Vertebrate Paleontology, Natural History Museum of Los Angeles County. However, the species is considered a nomen dubium due to the lack of an actual diagnosis and naming of a holotype. A review of the history of the species name is presented, with the recognition of the existence of a type specimen for the species. Also, Stock´s original manuscript is transcribed, with an update of the nomenclature.

#### INTRODUCTION.-- The fossil skull cataloged as LACM(CIT) 3229 is presently stored at the Types Case of the Section of Vertebrate Paleontology, Natural History Museum of Los Angeles County. It is labeled as the holotype for the subspecies Equus conversidens leoni Stock, 1953. The species name and holotype specimen have a convoluted history that is presented in the following paragraphs (see also Arroyo-Cabrales and Johnson, 2003, including an illustration of the specimen).

In 1931, Chester Stock, renowned paleontologist at the California Institute of Technology, sent to Wesley Bliss to search for promising paleontological Quaternary localities in northern México. Bliss, Stock´s former student, eventually reported on one locality that had “as many bones as matrix” (McNassor, 1992), San Josecito Cave (Stock, 1943). Subsequently, Stock sent excavation teams that intensively dug between 1935 and 1941. Among the outstanding and abundant findings, several specimens pertained to a Pleistocene horse, including complete skulls (Stock, 1943).

Later on, Stock (1950) reported the presence of 25,000-year-old horse remains from San Josecito Cave; and in the legend of the only published illustration, a composite skeleton was shown, identified as Equus conversidens leoni. Stock (1950) indicated the size and some other skeletal differences distinguishing the horse from San Josecito Cave and late Pleistocene Equus occidentalis Leidy, 1865 from Rancho La Brea (Los Angeles, California, U.S.A.). The height of the skeleton from San Josecito Cave, at the top of the highest thoracic neural spine, was indicated in the figure as approximately 122 cm.

 In the proceedings of a scientific meeting held in México, published posthumously (Stock died in December 1951) in Spanish, Stock (1953) demonstrated that the San Josecito Cave horse was similar to Equus conversidens Owen, 1869 in general size (based on the upper third molar length) and in the occlusal pattern of upper molars. However, enough variation existed (the premolar styles are slightly wider and the external fascies of paracone and metacone are shallower) to recognize the San Josecito Cave horse as a distinct form at the subspecific level, naming it as the subspecies leoni, for the Mexican state in which the cave is located. It was this 1953 paper that is most commonly cited as the type description for the taxon.

The taxon Equus conversidens leoni has been used widely in the scientific literature in reference to the fossil Pleistocene horse from San Josecito Cave (e.g., Eisenmann, 1984; Kurtén and Anderson, 1980; Winans, 1989). However, according to Dalquest (1979), it is a nomen nudum, because neither of the two publications by Stock (1950, 1953) mentioning the name contains a valid description of the taxon.

 In the archives of the Section of Vertebrate Paleontology at the Natural History Museum of Los Angeles County (LACM), a typescript manuscript entitled "THE PLEISTOCENE HORSE OF SAN JOSECITO CAVE, NUEVO LEON, MEXICO" is signed by Chester Stock. The only available date for this manuscript is a short note on the first page, indicating that it was “in press, September 7, 1954". The manuscript provides the formal description of the San Josecito Cave horse, including the designation of a holotype and cotype, a diagnosis, and comparisons. The holotype is a skull, cataloged as LACM(CIT) 323, as well as a composite reconstructed postcranial skeleton, whose elements are from various different individuals. The skull is currently stored in one of the type specimen cases in the Section of Vertebrate Paleontology.

 It seemed that Stock had initiated a formal description of the taxon, but he was unable to complete the manuscript before his premature death. To determine whether such a manuscript was actually submitted as it stood, or remained as an archival document, a search to learn more about the whereabouts of this manuscript was undertaken.

 Several clues were considered, based on some statements in the manuscript, to determine whether a formal description of this taxon was ever published. The late Dr. Claude Hibbard was mentioned as having advised Stock on some taxonomic issues, including the systematic position of the horse. Later, Hibbard (1955), in dealing with a fauna from central México, and with horses from elsewhere in the country, discussed the validity of Equus conversidens Owen, 1869, but did not mention the San Josecito Cave horse.

 At the end of the manuscript, Stock noted that it was “Contribution 535 from the Department of Geological Sciences, California Institute of Technology” (CIT). Staff at the LACM have searched for any evidence that such a contribution was ever published, but nothing was located. The archivist at CIT was contacted by the LACM archivist who found that the title of “Contribution 535” corresponds with the original title of the present publication. However, it seems that it was never published, because no copy of such a publication can be located in the CIT or LACM archives.

 Another search was conducted at the Boletín de la Sociedad Geológica de México, because among the original “Legend for Plates” in the manuscript, a header appears for that bulletin. The archives of the Sociedad were reviewed, but no records exist regarding any manuscript having been submitted by Chester Stock.

 The various issues of the Bibliography of Fossil Vertebrates were also reviewed extensively. Starting with Camp et al. (1949) with the printed series sponsored by the Geological Society of America, and Nichols (1950) in the mimeographed list from the Society of Vertebrate Paleontology, the entire series was reviewed, up to the most recent one (Gregory et al., 1994). Both author and subject indexes were checked in search of Stock’s formal description of the San Josecito Cave horse, but nothing was found.

 Finally, after consulting with several specialists in both nomenclature and paleontology issues, it was decided that the best course was to make available Stock's original manuscript (Appendix I). However, it needs to be emphasized that Stock´s original designation of a new subspecies is not warranted in modern taxonomic usage, and that the reason for publishing this manuscript is to validate the holotype specimen that has been considered as such for a long time.

Regarding the manuscript itself, Stock chose as the holotype a skull, with a composite skeleton comprised of bones of various individuals. However, the International Commission on Zoological Nomenclature (1999) states that a single specimen should be named as holotype (Article 73). In conformance with that statement, those elements mentioned in Stock´s manuscript that do not constitute the holotype are indicated in brackets. Also, the current designation for the holotype repository is included in brackets, previous to the catalog number. As an additional note, the word Type is used after Stock´s original meaning as Holotype, while Cotype is used instead of the current Paratype.

As an aside, the catalog number for the holotype of Equus conversidens Owen, 1869 that was rediscovered and illustrated by Hibbard (1955), is specimen No. 403 in the Instituto Geológico de México. However, the specimen is currently assigned catalog number IGUNAM 4008, and housed at the Instituto de Geología, Universidad Nacional Autónoma de México (Carranza-Castañeda and Miller, 1987).

Most of the original plates and figures that should have been part of Stock´s manuscript were not found, with the exception of the four photographs of the cranium and mandible (Figures 1-4) that accompany the description (the LACM Photographic Collection catalog number is provided in brackets in the figure legends). Several other plates and figures, for other manuscripts planned by Stock, were in draft versions but were never completed. The original legends for those illustrations were placed in Appendix II at the end of the manuscript.

Since the manuscript was written more than 50 years ago, it was tempting for us to update some sections with their current use. Such would be the case with the use of “Pleistocene” instead of the “North American Rancholabrean Land Mammal Age correlative”, and also the Systematics account for the species that should appear as (after McKenna and Bell, 1997):

Class Mammalia Linnaeus, 1758

Order Perissodactyla Owen, 1848

Suborder Hypomorpha Wood, 1937

Family Equidae Gray, 1821

Genus Equus Linnaeus, 1758

However, in order to respect as much as possible the text format that Chester Stock used for the manuscript, the title and most of the original text is maintained. Some grammar and format changes in the original text have been made for clearer reading, including the use of capital letters to designate upper cheek teeth and lower case letters for the lower dentition. The notes from the original manuscript are included in the present manuscript text. Several tables originally located within the text have been moved to the end of the text to comply with present publication standards. Finally, the complete citations for the publications referred to in the text are provided in the Literature Cited in modern format. These citations differ from the short format with the journal volume and pages provided in the original manuscript for most of the cited authors, but not all. Additional references in the text for clarification appear in brackets.

A large collection of horse remains from San Josecito Cave is on deposit in the collections of the Section of Vertebrate Paleontology at the LACM. That collection was studied preliminarily by Devin (1968), but further statistical analyses using modern techniques are warranted, but those are beyond the scope of this paper.

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**FIGURES CAPTIONS**

FIGURE 1—Holotype of Equus conversidens leoni Stock, 1953. Skull LACM(CIT)3229, dorsal view. Photograph VP4256.

FIGURE 2—Holotype of Equus conversidens leoni Stock, 1953. Skull LACM(CIT)3229, lateral view. Photograph VP4253.

FIGURE 3—Holotype of Equus conversidens leoni Stock, 1953. Skull LACM(CIT)3229, ventral view. Photograph VP4252.

FIGURE 4—Holotype of Equus conversidens leoni Stock, 1953. Mandible LACM(CIT)3229, dorsal view. Photograph VP4249.

APPENDIX I

**THE PLEISTOCENE HORSE FROM SAN JOSECITO CAVE,**

**SOUTHERN NUEVO LEON, MEXICO**

**CHESTER STOCK**

Deceased, formerly Professor, Department of Geological Sciences, California Institute of Technology, Pasadena, California; Curator of Vertebrate Paleontology, Los Angeles County Museum of Natural History, Los Angeles, California.

**ABSTRACT**. A skull and composite skeleton of a horse is described from the Pleistocene of San Josesito Cave, southern Nuevo Leon, Mexico. This material is identified as belonging to Equus conversidens, a species described from the Valley of Mexico by Sir Richard Owen in 1869. The type from San Josecito Cave is regarded as subspecifically different. Equus conversidens leoni new subspecies resembles E. conversidens in size, in the small size of the M3, and in the enamel pattern of the upper cheek teeth. It differs by possessing slightly heavier styles on the premolars and shallower external faces of the paracone and metacone. E. c. leoni resembles E. przewalskii and Burchell´s zebra in general size. It exhibits characters in the skull and dentition, which are considered "zebraic". A zebrine character of the skeleton is displayed by the very small hoofs. However, on the basis of proportions of skeletal parts and of the skull, E. c. leoni deviates from both E. burchelli and E. przewalskii. It likewise differs widely from the living wild ass in these proportions.

INTRODUCTION

Excavations by the California Institute of Technology in Pleistocene deposits of San Josecito Cave, southern Nuevo Leon, Mexico[[1]](#footnote-1) [Stock, 1943] have revealed the presence of a number of individuals of the characteristic horse (Equus) from this locality. An abundance of fossil material has therefore

permitted the construction of more than one mounted skeleton, and while these specimens are composites, they show features not heretofore recognized in North American equines of the Ice [Pleistocene] Age. Moreover, important facts concerning the stature of the animal as well as the association of skull, dental, and skeletal characters in the extinct species of the Mexican horse are determined for the first time.

A review of the known fossil horse material of the genus Equus from southern Mexico brings to light the fact that while several species have been described, all are known by fragmentary and incomplete remains. Of these, at least two, namely Equus conversidens and E. tau, still are considered valid after a lapse of more than eighty years since they were first recorded. A comparison of the fossil horse from San Josesito Cave with the two species mentioned indicates a close resemblance to E. conversidens, with however some differences, on which the [San Josecito Cave] form is recorded as subspecifically distinct from the latter.

DESCRIPTION OF THE MATERIAL [SYSTEMATICS]

Equus conversidens leoni, new subspecies

TYPE SPECIMEN. No. [LACM(CIT)]3229 Calif. Inst. Tech. Vert. Paleon. Coll., skull [with composite parts of a skeleton], plate I and II.

CO-TYPES. No. [LACM(CIT)]3230, a skull and composite skeleton deposited in the collections of the Instituto de Geologia Mexicana; no. [LACM(CIT)]3928, a fragmentary palate with incisors and cheek-teeth.

LOCALITY. [CIT Locality 912], San Josecito Cave, southern Nuevo Leon, Mexico; Pleistocene.

DIAGNOSIS[[2]](#footnote-2). Size of E. c. leoni like that in the type of Equus conversidens Owen (No. 403 Geol. Inst. Mex.), upper molar 3 small, styles (parastyle and mesostyle) on premolars slightly heavier, outer surface of paracone and metacone flatter than in Equus conversidens.

DISCUSSION. Among the several species of fossil horses described from the southwestern part of the United States and from Mexico, closest resemblance of the equine from San Josecito Cave appears to be with Equus conversidens Owen, 1869. This type in the collections (No. 403) of the Geological Institute of Mexico, was described by Sir Richard Owen from the Valley of Mexico [Owen, 1869]. It consists chiefly of the maxilla of each side with the cheek-tooth series (P2-M3) of both the right and left sides present.

Gidley, who studied the species in 1901, was of the opinion that of the characters ascribed to E. conversidens, that on which the species was named, namely the character of convergence forward of the cheek-tooth series, was based upon a mistaken orientation of the maxillae on each side along their median contact [Gidley, 1901]. As a matter of fact, Gidley expressed the opinion that the two opposite sides belonged to two different individuals. Dr. Claude W. Hibbard[[3]](#footnote-3), most recent student of the Pleistocene horses of Mexico, has, however, concluded that the two parts were wrongly oriented when the specimen was figured by Owen. It is interesting to note that Cope[[4]](#footnote-4) in 1884 expressed the belief that the principal character employed by Owen in establishing the species was not a natural feature but was due to distortion [Cope, 1884].

This has been corrected in the new restoration of the type. Owen [1869] also noted a difference in the enamel pattern of the second upper premolar, particularly with regard to the anterior lobe. But examination of the actual specimen[[5]](#footnote-5) reveals the fact that the lobe is broken away on the tooth of the right side and the enamel at the anterior end is damaged on the tooth of the left side. The principal character distinguishing E. conversidens, according to Gidley, was therefore the comparatively small size of M3 and the type of anterior lobe of P2. If we discard the latter character, the only feature that remains is the size of the last upper molar. In the series of specimens available from San Josecito Cave are some in which the last upper molar is of a size comparable to that in E. conversidens [Table 1]. In other dental series from the same locality this tooth does not show the size seen in LACM(CIT) 3928, but is larger. In these, LACM(CIT) 3229, and LACM(CIT) 3230, now in the collections of the Instituto de Geologia Mexicana, there is not so noticeable a difference in width of tooth-row between the front and hind ends of the tooth-row as in LACM(CIT) 3928. It is evident, therefore, that this tooth varies in size.

Considerable resemblance prevails between LACM(CIT) 3928, and the Mexican type No. 403 of E. conversidens in diminishing transverse width of the upper tooth row from P2 to M3 and in the enamel pattern of the teeth. P2 lacks the tiny enamel lake which occurs in front of the prefossette in No. 403. As in the type of E. conversidens, a pli caballin is in evidence particularly on premolar teeth of the specimens from San Josesito Cave.

The outer styles (parastyle and mesostyle) are slightly heavier in the premolars, and the outer faces of paracone and metacone are flatter in specimens from San Josecito Cave than in the type of E. conversidens. Hence, the specimens from the latter locality are regarded as belonging to a subspecies distinct from that to which the skull fragment (No. 403) from the Valley of Mexico is assigned.

COMPARISON WITH MODERN EQUINES

The so-called San Josecito horse may be likened in general size to Przewalsky’s horse and the Burchell Zebra, the calculated average living shoulder height being 51.4 inches (Przewalsky – 49.4 inches; Burchell zebra- 49.2 inches). There are, however, many dissimilarities in the detailed proportioning of these types. The skull of E. conversidens leoni, in contrast to that of E przewalskii, is broad and only of average facial length. The index 100 X Frontal width/Facial length in E. c. leoni averages 61.8, in the ass it is 64.0, while in the long-muzzled, relatively narrow-headed E. przewalskii it is 56.5. In the Burchell zebra it is 53.9. The San Josecito horse has a broad muzzle and a very narrow nuchal crest. The permanent cheek teeth of the lower jaw tend to present the sharp, V-shaped groove, separating the metaconid and metastylid parts of the column that has been regarded as a zebraic character. The lower milk teeth show the presence of a parastylid (see Figures 3b and 3c), and a hypostylid in Dp3 in No. 3930 (Figure 3b). These features of the enamel pattern in the milk teeth are regarded by McGrew[[6]](#footnote-6) [McGrew, 1944] as either valid or significant zebraic characters.

The dental index (length of cheek-tooth row/basilar length) is very small in E. conversidens leoni, being only 32.7. In the zebra this index is 33.3; in the ass 34.3; in the arab horse 34.4; and in Przewalsky’s horse 37.2.

The cephalic index of E. c. leoni is 45.5. This lies between that of the horse (arab, 42.7; Przewalsky’s 43.6) and that of the ass (46.9). In the zebra this value is 41.5. The form of the two parietal ridges terminating posteriorally in the occipital crest also appears to be zebraic.

The skull of E. conversidens leoni may be likened most generally to that of a broad-headed zebra, a status which, in view of the wide range in the cephalic index of living E. burchelli, is at least a possibility. Even the vomerine index (as near as can be determined from the imperfect skulls) was possibly zebraic, although more likely equine, and definitely not that of an ass.

The general body-build of E. c. leoni resembles that of E. przewalskii, and is not quite so heavy as that of E. burchelli. The radius is relatively quite short, but otherwise the limb-bone lengths present no disproportion from that of typical Equidae. The skeleton could be that of a fairly large E. burchelli, which is further suggested by the small hoofs.

COMPARISON WITH FOSSIL HORSES FROM THE PLEISTOCENE

The status of the Pleistocene horses of the genus Equus from the Valley of Mexico was reviewed by J.W.Gidley in 1901[[7]](#footnote-7) [Gidley, 1901]. During the past forty-nine years nothing much, if anything, has been added to our knowledge of these forms, nor have any types been described.

Among the species thus far known, the first to be recorded was Equus conversidens Owen. In the same year (1869) and in the same publication[[8]](#footnote-8) Owen [Owen, 1869] likewise described the species Equus tau. Owen and subsequently Gidley, both were of the opinion that E. tau was a very small horse. To quote from Gidley[[9]](#footnote-9) [Gidley, 1901]: “this species is much the smallest of any described from America. Owen considered it about the size of the common Ass, but it is much smaller than that species, E. conversidens and E asinus being much more nearly of a size…”.

In addition, two species from the Pleistocene of Mexico were recorded by Cope, namely Equus crenidens from the deposit of Tequixquiac and Equus barcenaei from the Valley of Mexico. According to Gidley[[10]](#footnote-10) E. crenidens appeared indeterminate on the basis of its characters that were given. He, likewise, regarded E. barcenaei as synonymous with E. tau. It has not been possible for the writter to gain further, independently derived, facts on the last three species. One observation appears pertinent, namely, the types of horses described from the region of the Valley of Mexico and cited above are all of size close to that of E. conversidens, and therefore presumably of a size comparable to that of E. conversidens leoni.

In this contribution on the Geologie von Mexico, W. Freudenberg (p. 139, 1921) [Freudenberg, 1921] lists in the Pliocene and post-Pliocene fauna of Mexico the following species of Equus: Equus sp. nov.; E. crenidens Cope; E. tau Owen (E. barcenaei Cope); E. aff. semiplicatus Cope; E. complicatus Leidy; E. excelsus Leidy; E. conversiddens Cope; E. giganteus Gidley

Unfortunately no section on the Equidae was later published by Freudenberg in his project review of the Pliocene and post-Pliocene faunas of Mexico. No attempt is made in the present paper to survey all the species of Equus listed by Freudenberg.

A small species of Pleistocene horse, Equus francisci, was described by O. P. Hay[[11]](#footnote-11) in 1915 [Hay, 1915] from Wharton County,Texas. According to this author, E. francisci had apparently the size of Equus tau Owen. The enamel of the cheek teeth possessed a simple pattern. In the lower teeth available, the notch in the metaconid-metastylid column is V-shaped.

Equus conversidens leoni is of smaller stature than either E. occidentalis or E. scotti. The enamel pattern of the cheek-teeth is more complex in the Mexican species, and the skull differs also in its flatter dorsal surface, narrower occiput, less deep muzzle and mandible.

Equus scotti, like E. occidentalis, is a large-headed species. Gidley states that its skeleton “represents an animal with a head about the size of that of a large draught horse, but with the height of body very similar to that of the Zebra or Quagga” [Gidley, 1900 – not cited by Stock]. The cheek-teeth of E. conversidens differ from those in E scotti in much smaller size. Total length of molar-premolar series: E. c. leoni 150.5-156.7mm; E. scotti 190mm.

A comparison of the measurements of E. c. leoni with the comparable measurements of the skull in the species Equus laurentius as described by O.P. Hay in 1913 [Hay, 1913 – not cited by Stock],

emphasizes a close size relationship of the head in these two forms. In E. conversidens leoni, the inferior margin of the mandible is not so straight as in E. laurentius, and the width of the jaw across the angular area is not so wide, but presumably these differences are largely due to age.

One of the more striking differences in the pattern of the enamel in lower cheek-teeth is the sharper, V-shaped groove of the metaconid-metastylid column in E. conversidens than in E. laurentius.

Judging from the measurements of the limb elements, the Pleistocene horse from Mexico resembles E. laurentius closely in size and proportion, but the hoofs, both front and hind, are definitely broader in the latter.

MILK TEETH

The upper milk dentition is represented by DM2, DM3, and DM4. In specimen LACM(CIT) 3929 DM2 is tentatively placed with DM3 and DM4 (Figure 3a) [Table 2]. These teeth are not so narrow transversely as the milk teeth of E. occidentalis, and the protocone on individual teeth in the former is broader. Likewise, in the Mexican horse the borders of the fossettes show more crinkling of the enamel.

The lower milk teeth, Dm2, Dm3 and Dm4, are best exemplified by LACM(CIT) 3930 C.I.T. (Figure 3b) [Table 3]. These teeth show a character in which they are distinctly more advanced than the comparable teeth in E. occidentalis. The outer enamel walls of protoconid and hypoconid show much more flattening than in the Pleistocene horse from California, and as a matter of fact are very slightly concave in the former. An anteroexternal style occurs at the forward end of protoconid and increases progressively in prominence from the first to last tooth.

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Table 1. Measurements (in millimeters) of cheek teeth.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | LACM(CIT) 3229 | LACM(CIT) 3230 | LACM(CIT) 3928. | No. 403 Inst.Geol. Mex. |
| Length of tooth row, P2-M3 | 156.7 | 150.5 | 152.1 | 147.1 |
| P2, anteroposterior diameter through middle | 32.6 | 32.5 | 33.2 | 33.6 |
| P2, transverse diameter across mesostyle and protocone | 22.4 | 25.8 | 24.1 | 22.4 |
| P2, anteroposterior diameter of protocone | 9.8 | 8.9 | 9.0 | 8.7 |
| P3, anteroposterior diameter through middle | 25.5 | 24.9 | 25.0 | 24.6 |
| P3, transverse diameter across mesostyle and protocone | 24.6 | 27.1 | 25.2 | 23.6 |
| P3, anteroposterior diameter of protocone | 12.9 | 10.2 | 11.6 | 11.3 |
| P4, anteroposterior diameter through middle | 25.3 | 23.6 | 24.2 | 24.8 |
| P4, transverse diameter across mesostyle and protocone | 25.1 | 25.7 | 23.5 | 22.9 |
| P4, anteroposterior diameter of protocone | 13.7 | 11.6 | 13.2 | 11.9 |
| M1, anteroposterior diameter through middle | 22.8 | 22.1 | 22.7 | 22.3 |
| M1, transverse diameter across mesostyle and protocone | 23.9 | 24.0 | 23.8 | 22.1 |
| M1, anteroposterior diameter of protocone | 12.9 | 10.5 | 14.0 | 10.9 |
| M2, anteroposterior diameter through middle | 23.3 | 21.7 | 22.7 | 22.4 |
| M2, transverse diameter across mesostyle and protocone | 22.7 | 23.4 | 21.2 | 20.9 |
| M2, anteroposterior diameter of protocone | 12.9 | 10.4 | 12.8 | 11.5 |
| M3, anteroposterior diameter through middle | 27.3 | 23.3 | 21.9 | 22.0 |
| M3, transverse diameter across mesostyle and protocone | 19.7 | 19.7 | 15.4 | 16.2 |
| M3, anteroposterior diameter of protocone | 12.8 | 9.9 | 12.1 | 10.6 |

Table 1. Continuation.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | LACM(CIT) 3229 | LACM(CIT) 3230 | LACM(CIT) 3928. | No. 403 Inst.Geol. Mex. |
| Length of tooth row, P2-M3 | 156.7 | 150.5 | 152.1 | 147.1 |
| I1, long diameter of oclusal surface |  |  | 16.9 |  |
| I1, short diameter of occlusal surface |  |  | 10.5 |  |
| I2, long diameter of oclusal surface |  |  | 19.3 |  |
| I2, short diameter of occlusal surface |  |  | 10.6 |  |
| I3, long diameter of oclusal surface |  |  | 20.1 |  |
| I3, short diameter of occlusal surface |  |  | 9.3 |  |
| Anterior end of p2 to posterior end of m3 | 151.6 | 148.4 |  |  |
| p2, anteroposterior diameter through middle | 27.8 | 27.5 |  |  |
| p2, transverse diameter metaconid to hypoconid | 11.7 | 10.8 |  |  |
| p3, anteroposterior diameter through middle | 25.6 | 24.4 |  |  |
| p3, transverse diameter metaconid to hypoconid | 15.1 | 15.9 |  |  |
| p4, anteroposterior diameter through middle | 25.1 | 24.0 |  |  |
| p4, transverse diameter metaconid to hypoconid | 14.8 | 16.3 |  |  |
| m1, anteroposterior diameter through middle | 22.1 | 21.8 |  |  |
| m1, transverse diameter metaconid to hypoconid | 13.4 | 14.4 |  |  |
| m2, anteroposterior diameter through middle | 23.0 | 22.6 |  |  |
| m2, transverse diameter metaconid to hypoconid | 12.7 | 13.5 |  |  |
| m3, anteroposterior diameter through middle | 27.2 | 27.4 |  |  |
| m3, transverse diameter metaconid to hypoconid | 11.9 | 13.2 |  |  |

Table 2. Measurements (in millimeters) of Upper Milk Teeth in LACM(CIT) 3929.

|  |  |
| --- | --- |
|  | LACM(CIT) 3929 |
| DM2, anteroposterior diameter | 35.6 |
| DM2, transverse diameter from mesostyle to protocone | 22.11 |
| DM3, anteroposterior diameter through middle | 27.2 |
| DM3, transverse diameter from mesostyle to protocone | 23.2 |
| DM4, anteroposterior diameter through middle | 27.9 |
| DM4, transverse diameter from mesostyle to protocone | 21.6 |

Table 3. Measurements (in millimeters) of Inferior Milk Teeth.

|  |  |  |
| --- | --- | --- |
|  | LACM(CIT) 3930 | LACM(CIT) 3931 |
| Dm2, anteroposterior diameter through middle | 31.3 |  |
| Dm2,transverse diameter from metaconid to protoconid | 9.4 |  |
| Dm2,anteroposterior diameter of metaconid-metastylid column | 14.7 |  |
| Dm3, anteroposterior diameter through middle | 27.5 | 28 |
| Dm3,transverse diameter from metaconid to protoconid | 11.7 | 11.1 |
| Dm3,anteroposterior diameter of metaconid-metastylid column | 15.1 | 15.6 |
| Dm4, anteroposterior diameter through middle | 28.4 | 30.2 |
| Dm4,transverse diameter from metaconid to protoconid | 11.3 | 10.6 |
| Dm4,anteroposterior diameter of metaconid-metastylid column | 15.3 | 16 |

Table 4. Measurements of skulls of Equus conversidens leoni (in mm); relative number is in relation to basilar length.

|  |  |  |
| --- | --- | --- |
|  | LACM(CIT) 3229 | LACM(CIT) 3230 |
|  | Absolute | Relative | Absolute | Relative |
| Vertex length | 527 | 109.8 | 537 | 114.0 |
| Basilar length | 480 | 100.0 | 471 | 100.0 |
| Frontal width | 227 | 47.3 | 206 | 43.7 |
| Facial length (projected) | 357 | 74.4 | 344 | 73.0 |
| Cranial length (projected) | 170 | 35.4 | 193 | 41.0 |
| Occupit height | 315 | 65.6 | 278 | 59.0 |
| Height of occipital bone | 103 | 21.5 | 111 | 23.6 |
| Diastema length | 96 | 20.0 | 104 | 22.1 |
| Muzzle length | 72 | 15.0 | 67 | 14.2 |
| Molar-premolar series (upper) | 158 | 32.9 | 153 | 32.5 |
| Palate to vomer | 110 | 22.9 | 104 | 21.1 |
| Vomer to foramen magnum | 128 | 26.7 | 121 | 25.7 |
| Length of mandible | 423 | 88.1 | 435 | 92.4 |
| Height of mandible | 239 | 49.8 | 214 | 45.4 |
| Orbit, horizontal diameter | 60 | 12.5 | 61 | 12.9 |
| Orbit, vertical diameter | 55 | 11.5 | 56.5 | 12.0 |
| M2 width at middle | 25 | 5.1 | 25.5 | 5.4 |

APPENDIX II

LEGENDS FOR PLATES

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Plate I Equus conversidens leoni n. subsp. Skull, No. [LACM]3229, Calif. Inst. Tech. Vert. Paleont. Coll., (a) dorsal [VP4256] and (b) ventral [VP4252] views, X1/4. San Josecito Cave, southern Nuevo Leon, Mexico. Pleistocene.

Plate II Equus conversidens leoni n. subsp. (a) Skull and (b) mandible, No. [LACM]3229, Calif. Inst. Tech. Vert. Paleont. Coll., lateral view [of skull, VP4253] [and dorsal view for mandible, VP4249], X1/3. San Josecito Cave, southern Nuevo Loen, Mexico. Pleistocene.

Plate Equus conversidens leoni n. subsp. Skull and composite skeleton, No. 3229, Calif. Inst. Tech. Vert. Paleont. Coll., lateral view. San Josecito Cave, southern Nuevo Leon, Mexico. Pleistocene.

LEGENDS FOR TEXT FIGURES

Figure 1. (a) Equus conversidens leoni n. subsp. No. 3928, Calif. Inst. Tech. Vert. Paleont. Coll., (b) E. conversidens Owen, No. 403, Mex. Geol. Inst. Upper cheek-teeth, P2-M3, natural size. No. 3928, San Josecito Cave, southern Nuevo Leon, Mexico; No. 403, Valley of Mexico. Pleistocene.

Figure 2 a-d Equus conversidens leoni n. subsp. Occlusal patterns of upper and lower cheek-teeth. (a) No. 3230, P2-M3; (c) No. 3230 p2-m3;; (b) No. 3229 P2-M3; (d) No. 3229,

p2-m3; natural size. No. 3229, Calif. Inst. Tech. Vert. Paleont. Coll.; No. 3230, Mex. Geol. Inst. Coll. All specimens from San Josecito Cave, southern Nuevo Leon, Mexico. Pleistocene.

Figure 3 a-c Equus conversidens leoni n. subsp. Occlusal patterns of upper and lower milk teeth.

(a ) No. 3929, (b) No. 3930, (c) No. 3931; all figures natural size, Calif. Inst. Tech. Vert.

Paleont. Coll. San Josesito Cave, southern Nuevo Leon, Mexico. Pleistocene.

Figure 4 Equus conversidens leoni n. subsp. Occlusal view of upper incisors and canine. No.

3928, Calif. Inst. Tech. Vert. Paleont. Coll., natural size. San Josesito Cave, southern

Nuevo Leon, Mexico. Pleistocene.

Figure 5 Diagram showing skeletal and skull rations in Equus conversidens leoni n. subsp., E.

occidentalis Leidy, E. burchelli Gray, and E. przewalskii Polliakov.

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