TRANSACTIONS

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Corrections.

Page 9, l. 29: For *Allen* read *Allan.*

Page 14, l. 31: For *lissukâ* read *lissuḫâ.*

Page 15, l. 24: . . . . . is to be removed.

Page 29, l. 26: For I read II.

Page 37, l. 5: For *Barnaburiash* read *Burnaburiash.*

Page 43, l. 26: For *Ménaut* read *Ménant.*

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TRANSACTIONS

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AMERICAN PHILOSOPHICAL SOCIETY.

ARTICLE I.

OLD BABYLONIAN INSCRIPTIONS CHIEFLY FROM NIPPUR.

BY H. V. HILPRECHT, PH.D.,

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Read before the American Philosophical Society, November 4, 1892.

PREFACE.

THE old Babylonian Cuneiform Texts, which are published in the following pages, are a part of the harvest gathered by the Expedition sent out in the summer of 1888, under the auspices of the University of Pennsylvania, for the exploration of Babylonia. The Rev. Dr. John P. Peters, Professor of Hebrew in the University of Pennsylvania, was the Director of the Expedition, while the subscriber, as the Assyriologist of the University, accompanied it during the first year of its labors. As the history of the Expedition is to be published by its Director at an early date, I here abstain from giving any account of its origin, members, undertakings and results. In the meantime for the student I have appended to the Introduction a Bibliography of those contributions of its members to various periodicals which relate to its work.

Towards the close of the year 1891 there arrived at the Museum of the University some eight thousand clay tablets, together with several hundred fragments of vases and other inscribed objects in stone, which had been disinterred in Nippur or Nuffar.* I was able at once to proceed with the work of cleaning and examining

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them. Three months later I had obtained a general idea of their contents and their age, and had catalogued about a third of them. On the basis of a report submitted to the Publication Committee of the Expedition, of which Mr. Clarence H. Clark is Chairman, a plan was carefully devised for making these cuneiform inscriptions accessible to a wider circle of students, with as much speed and method as possible. With this view the Assyriologists of America and Canada were invited to lend their aid to the preparation of an extensive work on the Expedition and its results. A number of them have given assurance of their readiness to do so.

In April, 1892, the undersigned was entrusted by the Committee with the editing of the series containing the Cuneiform Texts, and, at the same time, was requested to undertake at once the preparation of the first volume of these texts. It is estimated that the series will extend to eight or possibly ten volumes. Their general plan and character are well explained in a report submitted to the American Philosophical Society by a special committee, of which Mr. Talcott Williams was the Chairman, at the stated meeting of May 20, 1892.

I take this opportunity to acknowledge the liberality of the venerable American Philosophical Society of Philadelphia, as shown in the promptness with which it has undertaken the publication of the present volume, by giving it a place in its learned and valuable Transactions. I hope that in the future the Society will continue to evince its interest in making such labors accessible to the republic of letters, by extending its sympathy and support to the undertaking whose plan has been described.

A word more must be said as to the manner in which it is intended to prepare the Cuneiform Texts for the use of the Assyriologist. For the sake of securing uniformity throughout the series, and of avoiding what would make it excessively costly, it was necessary to reproduce the inscriptions by photograph from copies made by hand, rather than from the objects themselves. Besides, the editor some time ago reached the conclusion that the method of direct photography is not at all satisfactory in the case of many inscriptions. The best which has been done by that expensive process is beyond question the work edited by Ernest de Sarzec and Léon Heuzey under the auspices of the government of France: *Découvertes en Chaldée.* It possesses unique merits. But in spite of all the care that has been taken to secure an exact reproduction of the monuments, any Assyriologist who has worked through such texts as are found on Plates 33, 35 and 41, No. 1, will agree with me that the decipherment, especially of the margins, makes a very severe demand upon the eyesight—a circumstance which makes the prompt and comprehensive use of the contents of this beautiful work sometimes difficult. After mature consideration, therefore, the Committee found it most suitable to reproduce the Cuneiform Texts from copies made by the hand, and to employ photographs from the objects themselves only occasionally, to enable the Assyriologist to verify the copies and to perceive the archæological character of the inscribed objects.

The first volume, whose first part I publish herewith, contains only inscriptions in old Babylonian which have been found on vases, door sockets, stone tablets, votive axes, bricks, stamps, clay cylinders, and similar objects of a monumental character. As the most of them belong to that period of Babylonian history of which our knowledge is very defective, the most painstaking care has been applied to autographically reproducing the originals with the utmost faithfulness. The editor has kept in view, not only the making fresh and important materials accessible to students of Assyriology, but also the doing his part in placing Babylonian paleography on a better foundation. For this end every text has been reproduced in its actual size and form—that is, so as to show all the peculiarities of the scribes, not only as to the dimensions, shape and position of every character and group of such, but also their distance from one another, as was so admirably done by Sir Henry Rawlinson and Edwin Norris in the first volume of *The Cuneiform Inscriptions of Western Asia.* The investigations and collections I have made since the year 1883, and my lectures regularly held since 1886 on "The Development of Cuneiform Writing in Babylonia and Assyria," have led me to conclude that the size and relative position of individual cuneiform characters, and certain combinations in which they frequently occur, have been a factor of importance in the development of the stereotyped forms of later date. The detailed proof of this I must reserve for the present until more urgent matters have been disposed of. At any rate, careful editions of texts, and a faithful reproduction of the peculiarities of the individual Babylonian scribe, have become a pressing necessity for the progress of Assyriology, if we are to attain in this field anything like the results which Euting has achieved in other departments of Semitic paleography, and which are so necessary in determining the age of fragmentary and undated inscriptions. In spite of the scantiness of representative old Babylonian texts of which the Assyriologists could make use, it would not have been possible for them to have differed by 500, 1000 or even 2000 years as to the date of inscriptions, if such texts had always been reproduced carefully for their use.

It is to be expected that the excavations still proceeding at Nuffar will supply the completion of texts here given in fragmentary shape, and that several finds will make their way into various European and American museums by reason of the thievishness of the Arabs employed in them, who also may carry on excavations on their own account.* For this reason I have shown as exactly as possible the fracture

* Cf. my note in *Zeitschrift für Assyriologie* IV, p. 282 *seq.* Sayce, *Records of the Past*², Vol. III, pp. x, note 3, XV.

of such fragments. It was thus that I myself, after the printing had begun, was enabled to recognize the connection of Pl. 21, No. 41 and No. 46, and between Pl. 22, No. 50, and Pl. 26, No. 74.

Where I have shaded the inscription in my copy, it is not meant to indicate that the reading is to me uncertain, but that it can be recognized only in a special light and by a practiced eye, looking at it from an especial angle. How necessary it was to make an autograph copy of such inscriptions may be seen by comparing Pl. 23, Nos. 56, 57, and the direct photographic reproduction on Pl. X. A restoration of broken characters and lines I have avoided on principle, even when there was no doubt in my own mind as to what was missing. My translations will show in due time what my understanding of such passages is. For obvious reasons, I have given the characters in some inscriptions only in outline. Of the plates which reproduce the inscription on the Abu Habba slab I have avoided altogether making an autograph copy, since I thought this needless. This stone was found in Abu Habba during the excavation undertaken at the private expense of the Sultan in 1889, and is now in the Imperial Museum at Constantinople. Through the courtesy of His Excellency Hamdy-Bey, a cast of it was furnished to our Expedition. Unfortunately this was broken in pieces in transportation, but it was restored by one of my students. It is this cast that has been directly photographed for the present publication. Some portions of its margin have an indistinctness, which is faithfully shown by the photographic reproduction.

To convey to scholars a clearer picture of the ruins of Nippur, and to show the sites at which the several inscriptions were found, a plan of the excavations of the first year is given. In the Table of Contents the texts are described with reference to this Plan, which has been prepared in accordance with the bas-relief of the ruins made by Mr. Charles Muret in Paris under the supervision of Mr. Perez Hastings Field, the architect of the Expedition.

In determining the mineralogic character of the several stones, I have had the assistance of my colleagues, Drs. G. A. Koenig and E. Smith, of the University of Pennsylvania, to whom I extend my thanks. As I was able to accompany the Expedition only during the first year, I am greatly indebted to my esteemed colleague, Dr. Peters, for much valuable information as to the sites in which objects were found, and for sketches and copies of a series of objects and inscriptions which he made during its second year. As the antiquities disinterred arrived in this country at long intervals, I found myself obliged to proceed with the help of casts, squeezes, electrotypes and Prof. Peters' notebooks, in order not to delay needlessly the publication of the Texts. This circumstance, however, prevented my determining at the outset the material of the whole volume. At the opening of each new box I found myself compelled to withdraw some pages and substitute others, until the commencement of the printing, in October of last year, made further alterations and a more systematic arrangement impossible. The second part of this volume, which will appear in about half a year, will furnish further inscriptions of kings who are already represented in the first. Nor will it be possible entirely to avoid this defect of arrangement in other volumes, so long as the excavations at Nippur continue to bring to light new inscriptions of the same rulers. If, however, we were to delay the publication of the inscriptions until the complete results of the systematic explorations of the ruin-heaps at Nippur were at hand, it would have been necessary, according to my careful calculation, to wait some twenty years, supposing that the excavations were pushed forward with a force of some hundred Arab workmen.

On account of its importance and its close connection with the class of Cassite votive inscriptions here published, I have included the cuneiform text on the lapis lazuli disc of King Kadashman-Turgu, which probably came from Nippur,* and is now in the Museum of Harvard University,† Cambridge, Mass. Prof. D. G. Lyon kindly gave me leave to publish this, and placed at my disposal a cast of the disc, for which he has my warmest thanks.

The transcription of the names of kings in the Table of Contents is the usual one. A new transliteration has been substituted only where there are sufficient grounds for departing from that formerly used. The texts in the main have been arranged chronologically, in the order of the Babylonian dynasties; yet where the better utilization of space seemed to justify this, and also, as already said, because it was impossible to obtain at the outset all the material of the present volume, I have departed from that order in a few instances. Nor have I attempted to distinguish between the inscriptions of Kurigalzu I and II, simply because, with the material now at our disposal, it is not possible to do so with any certainty.

Three other volumes of cuneiform texts are in preparation. The transcription and translation of the inscriptions here given are as good as completed, and will appear at an early date. From this translation I have excluded the Abu Habba slab and the two Yokha tablets (Plates VI–VIII). These latter are to be treated in connection with other tablets of similar character and contents. A translation of the former I

* Cf. Hilprecht, "Die Votiv-Inschrift eines nicht erkannten Kassitenkönigs," *Z. A.* VII, p. 318.

† Cf. Lyon, "On a Lapis Lazuli Disc" in the *Proceedings of the American Oriental Society*, May, 1889, pp. cxxxiv–vii.

propose to publish separately in the course of next summer, in coöperation with my esteemed colleague, Dr. P. Jensen, Professor in the University of Marburg.

In conclusion, it is but just that I should express here publicly my profound gratitude to Dr. William Pepper, Provost of the University of Pennsylvania, Messrs. Clarence H. Clark, E. W. Clark, W. W. Frazier, Charles C. Harrison, Prof. Dr. Horace Jayne, Prof. Allen Marquand, Jos. D. Potts, Rev. Dr. H. Clay Trumbull, Talcott Williams, Richard Wood, Stuart Wood, and to all the other gentlemen whose lively interest in the history and civilization of ancient Babylonia, and whose liberal and constant support, have made possible the thorough researches at one of the most ancient ruins of the world.* That the publication of this first part of the results obtained by the American Expedition does not take place until nearly four years after it was begun, is due to the extraordinary difficulties it encountered, on both sea and land, through shipwreck near Samos, through the hostility of Arab tribes, through the burning and plundering of our camp, through the outbreak of malignant cholera in Babylonia, through the delay of the antiquities on their way to America, and through the severe illness from which nearly all the members suffered. Often it seemed as though the grewsome curse of King Sargon I, one of the oldest monuments of Semitic speech published in the following pages, had rested on the American Expedition, as that of the Phœnician king Eshmunazar rested on Napoleon: "Whosoever removes this inscribed stone, his foundation may Bêl and Shamash and Ninna tear up, and exterminate his seed!" We trust, however, that the rage of Enlil, lord of the demons, who set loose against the Expedition all the Igigi and Anunnaki, will abate with the publication of these cuneiform inscriptions, almost every one of which proclaims the glory of the great Bêl, "lord of the lands," and that the curse of nearly six thousand years ago will be transformed into the kindly blessing which King Nazi-Maruttash utters in his poetic prayer:

iḳribishu ana shemê	to hear his prayer,
teṣlissu magâri	to grant his supplication,
unnênishu leḳê	to accept his sigh,
napishtashu naṣâri	to preserve his life,
ûmêshu urruke	to lengthen his days.

(Pl. 27, No. 78.)

H. V. HILPRECHT.

PHILADELPHIA, January 1, 1893.

* Cf. Pinches, *Records of the Past*², Vol. VI, p. 109, l. 6. (The Non-Semitic Version of the Creation Story).

INTRODUCTION.

The cuneiform tablets and stone inscriptions, excavated by the Expedition in Nippur, embrace a period of about 3350 years—c. 3800 to c. 450[1] B. C. About one hundred and twenty kings of Babylon, Ur and other cities are known to belong to this period of Babylonian history. Forty-five of these, according to our present knowledge, have left personal inscriptions or documents dated according to their reigns in Nippur. Several of these rulers, whose names were only partly preserved or otherwise obscure, or whose chronology and duration of reign were doubtful, have been placed in new light by the American excavations, while others can now for the first time be studied from their own inscriptions. Among other points the following have been established: The correct reading of *Ur-Ninib* of Isin, instead of *Gamil-Ninib*[2] as heretofore; the proof of the existence of King *Ibil-Sin*, or better, *Îni-Sin* of Ur,[3] already discovered by George Smith,[4] but not generally accepted by Assyriologists; the proper pronunciation of the name *Nazi-Maruttash;*[5] the correct transcription of the group *Ka-dash-man,* instead of the hitherto *Ka-ara,* in a series of Cassite proper names;[6] the completion of the name of the twenty-seventh king in the Babylonian list b[7] to *Shagashalti-Shuriash*[8] (Shamash is deliverance), instead of the usual *Shagashalti-Buriash*[9] (Rammân is deliverance); the completion of the Cassite king [. . . . . . *i*]*a-shu* in *S.* 2106, Obv. l. 9,[10] to *Bibeiashu,* and the identity of the latter with *Bibe,*[8] the son of Shagashalti-Shuriash; the first inscription of the

[1] Contract dated in the reign of King Artaxerxes I. A number of coins, about one hundred terra cotta bowls bearing Hebrew, Syriac and Arabic inscriptions, and many other objects, which belong to the Nippur of the Christian era, are here excluded.

[2] Hilprecht, "Die Votiv-Inschrift eines nicht erkannten Kassitenkönigs" in *Z. A.* VII, p. 315, note 1.

[3] Hilprecht, "König Ini-Sin von Ur" in *Z. A.* VII, pp. 343–346.

[4] *Trans. Soc. Bibl. Arch.* I, p. 41.

[5] Hilprecht, *l. c.*, pp. 310, 311.

[6] Hilprecht, *l. c.*, pp. 309, 314, 315.

[7] Winckler, *Untersuchungen zur Altorientalischen Geschichte,* p. 146, col. ii, 6.

[8] Hilprecht, "Die Ergänzung der Namen zweier Kassitenkönige," *Z. A.*, in print.

[9] Cf. Winckler in *Z. A.* II, p. 310, and *Unters.*, p. 30.

[10] Winckler, *Unters.*, p. 152.

kings *Rammân-shum-uṣur*[1] and his son *Mili-Shikhu;*[2] and the determination of the approximate duration of the reigns of the Cassite kings *Kurigalzu, Nazi-Maruttash,* etc., their succession and kinship with each other. In addition, the following new kings have been added by the Expedition to those already known: 1. *Âlusharshid;* 2. *Bur-Sin I;* 3. *Gande;*[3] 4. *Kadashman-Turgu* (*Kadashman-Bêl*); 5. *Kudur-Turgu* (*Bêl*); 6. *Bêl-nâdin-aplu.*

Intending to give in the near future the transcription and translation of the inscriptions here published, I confine myself at present to the following points:

THE OLDEST SEMITIC KINGS OF BABYLONIA.

Of the cuneiform inscriptions of the oldest Semitic kings of Babylonia very few have been discovered. Winckler recently published them together in his *Altbabylonische Keilschrifttexte,* p. 22.[4] Undoubtedly to this ancient period belongs also the inscription[5] of the king of the country of Guti, *i. e.,* "of the country and people to the east of the lower Zâb, in the upper section of the region through which the Adhem and the Dijâlâ rivers flow."[6] Various reasons[7] compel me to differ from Winckler's determination as to the date of this inscription by about 2000 years, *i. e.,* to transfer it from the time of Agum (Winckler, *Geschichte,* p. 82), about 1600 B. C., back to the time of Sargon, about 3800 B. C.[8] Because of the very archaic form of the cunei-

[1] Hitherto represented only by a boundary stone dated in the time of the kings Rammân-shum-iddina, Rammân-shum-uṣur and Mili-Shikhu. Cf. Belser in *Beiträge zur Assyriologie* II, pp. 187–203 (quoted hereafter as *B. A.*) and Peiser in Schrader's *Keilinschriftliche Bibliothek* III, Part 1, pp. 154–163 (quoted hereafter as *K. B.*)

[2] For the reasons for identifying the king of the inscription Pl. 29, No. 82, with Mili-Shikhu, see below, p. 36.

[3] Unless identical with Gandash, the first king of the Cassite dynasty. Cf. pp. 28–30.

[4] Cf. Winckler, in Schrader's *K. B.* III, Part I, pp. 98-107.

[5] Published by Winckler, *Z. A.* IV, p. 406.

[6] Delitzsch, *Wo lag das Paradies?* pp. 233–237. Cf. Delattre, *l'Asie occidentale dans les inscriptions Assyriennes.*

[7] The predominant use of the archaic line-shaped characters, their marked agreement with a whole series of characters on Plates 1 to 5, the Semitic speech, and its whole phraseology, together with the peculiarities to be seen in the sibilants, which are the same in the texts of Sargon I from Nippur, the fact that Abu Habba, where other texts of the same high antiquity have been disinterred, is the place of its discovery, the use of a "perforated stone" as votive object for the inscription, itself a characteristic of ancient times, the mineralogic character of the stone, and last of all—just what Winckler (*Z. A.* IV, p. 406) is disposed to regard as proof of a later origin—the notably sharp and skillful carving of the inscription. This last proof is especially convincing, for it is a characteristic trait of the oldest Semitic cuneiform inscriptions carved in stone, that they are engraved with a beauty and a sharpness which are absent from those of later date (cf. also Hommel, *Geschichte,* p. 301).

[8] It will not be objected that the cuneiform characters, indeed, seem to indicate a great antiquity, but that they may very well be an imitation of the work of an earlier period by a later king. This has become a very favorite mode of reasoning when the date of an undated inscription is to be determined from its writing (*e. g.,* Amiaud et Méchineau, *Tableau Comparé,* p. xiii *seqq.,* Pinches, *Hebraica* VI, p. 57), and serves to produce a very chaos of uncertainty in the province of Babylonian paleography. I think it opportune to state here that I am not acquainted with

form characters and of certain mutilated passages, this inscription of the king of Guti presents great difficulties, so that, to my knowledge, it has never been translated, and Winckler has come to the conclusion that it was composed "apparently in part in the native tongue" of the king of Guti. Winckler would not be entirely incorrect if he understood by this "native tongue"[1] the Semitic-Babylonian of the inscriptions of Sargon I, for the text is written in pure Semitic-Babylonian, and reads as follows: 1. *La-si*(?)-*ra*(?)-*ab*(?) 2. *da-num*[2] 3. *shar* 4. *Gu-ti-im* 5–10. vacant 11. *ip-ush*(?) -*ma* 12. *iddin* 13. *sha duppa* 14. *shú-a*[3] 15. *u-sa-za-ku-ni* 16. *zikir shum-su* 17. *i-sa-da-ru* 18. ^{ilu}*Gu-ti-im* 19. ^{ilu}*Ninna* 20. *ù* 21. ^{ilu}*Sin* 22. *ishid-su* 23. *li-su-ḫa* 24. *ù* 25. *zêra-su* 26. *li-il-gu-da* 27. *ù* 28. *ḫarrân alkat*(-*kat*)-*su* 29. *a i-si-ir*, "Lasirab (?), the mighty king of Guti, ... has made and presented (it). Whosoever removes this inscribed stone and writes (the mention of) his name thereupon, his

a solitary instance in which such an imitation of the older cuneiform characters by a later Babylonian ruler has been shown with certainty. What is commonly regarded as such may be traced to a lack of carefulness in examining the single characters of the inscriptions in question. Gande's endeavor to imitate the characters of earlier Babylonian kings is to be judged entirely differently (see below). In Babylonia at all times two systems of writing—a hieratic and a demotic—existed side by side. The latter is the system used in the affairs of everyday life, and was subject to a continuous process of change and development, which resulted at last in the stereotyped cuneiform characters of the Neo-Babylonian and Persian contract tablets. What I have called the hieratic system of cuneiform writing was identical with the demotic in the earliest times; but later was confined to religious literature (including seal-cylinders) and formularies originally bearing a religious character (boundary stones, etc.). Although, in the nature of things, it was less subject to change than the other, yet it developed distinctly different forms of most characters in the different periods of its history. In more or less dependence upon the material inscribed, the local tradition and the peculiarities of the individual scribe, the hieratic writing also passed through a course of development, more limited in extent, but peculiar to itself. When due attention is given to these facts in every case, there will be an end to the weltering confusion of early and late texts, and of the critical helplessness which results from this, in the field of Babylonian paleography.

[1] It is true, indeed, that the question as to whether the earliest inhabitants of Guti spoke a Semitic language (cf. Hommel, *Geschichte*, pp. 279, 306, note 2) cannot be regarded as definitely answered, if we maintain that the "perforated stone" was a gift of the king of Guti to the temple in Sippara (cf. "The King of Châna," *Trans. Soc. Bibl. Arch.* VIII, p. 352). In this case the inscription might very well have been composed in the Semitic dialect used in Sippara. I hold, however, that the object was not a gift of the king of Guti to the temple of Sippara (observe the absence of god Shamash and the first position given to god Guti), but that it had been carried off as booty from the land of Guti by one of the earliest Babylonian kings, in the same way as the vase of Narâm-Sin (*namrak Magan*) and most of the vases of Alusharshid (cf. Pl. 4, l. 11, 12: *namrak Elamti*) were carried to Babylonia. From this it certainly would result that, just like the inhabitants of Lulubi (cf. Scheil, *Recueil de Travaux* XIV, *livr.* 1 et 2, p. 104), so also those of Guti spoke Semitic and worshiped the Babylonian gods Ninna and Sin, along with their principal national god Guti. This last deity seems to have given his name to their country, as did the god Ashur to the city and land of Ashur (cf. also Ni(a?)nna and Nineveh, etc.), and the god Shûshinak to the city of Shûshinak or Susa (cf. Hagen in *B. A.* II, p. 233).

[2] Cf. Jensen, in Schrader's *K. B.* III, Part I, p. 116, note 5.

[3] Winckler offers *za*. Apparently this reading results from an oversight either on the part of Winckler or of the ancient scribe; for cf. Pl. 1, 13; Pl. 2 (and I), 14.

foundation may Guti, Ninna and Sin tear up and exterminate his seed, and may whatsoever he undertakes not prosper!"[1]

To the time of Sargon and Narâm-Sin[2] belongs also the first of the two inscriptions of Ser-i-Pul (*Stèles de Zohâb*), published by Messrs. J. de Morgan and V. Scheil in *Recueil de Travaux relatifs à la Philologie et à l'Archéologie égyptiennes et assyriennes* XIV, *Liv.* 1, 2, 1892, pp. 100–106. Both of these badly mutilated inscriptions are written in a Semitic[3] dialect, and the phraseology is very similar to that of the king of Guti. Scheil offers a transliteration and translation of the preserved portions. In regard to the first inscription I remark, however, that col. I, 11: *ù* DUB BA AM, can hardly be read (with Scheil) *u dubbam*.[4] The preceding phrase, *ṣalmêtum annîtum*, "these images," and the parallel passage of the Guti text and Pl. 1 and 2 of the present volume—*duppa shu'a*—require a demonstrative pronoun in connection with *duppa*. I therefore regard *BA* as the ideogr. for *shu'atu*,[5] and read *duppa shu'atam(-am)*, "this inscribed stone." The second character in col. II, 10, which Scheil does not recognize (*l. c.*, p. 105) is *il*,[6] and the line

[1] In the interpretation I remark the following: **L. 2.** *da-num* is not to be regarded independently as an appositive representing the usual *sharru da-num* (*Stèle de Zohâb* I, col. 1, 2), but must be joined with *shar Gutim*, as "the mighty king of Guti." The position of the adjective before the substantive is not so much due to the emphasis of the adjective (Del. *Gram.*, § 121) as to the endeavor to avoid separating the adjective from the noun to which it belongs. **L. 14.** *Shu'a* (or *shuwa*) is the older form from which *shu'atu*, resp. *shu'âtu*, has been derived. Cf. Arabic *huwa*, Del. *Gram.*, § 57, and Jäger, in *B. A.* I, p. 481 *seq.* **L. 15. 17.** *usazakuni*, *isaṭaru* are not present tenses of the stems III_2 and I_2 respectively (= *utsazakuni*, *itsaṭaru*), but, in consideration of l. 29, are to be regarded as III_1 and I_1 = *ushazakûni* (*Stèle de Zohâb* I, 12) = *ushazzakûni* = *ushanzaku* + *ni* (Del. *Gram.*, § 79 *β*) and *ishaṭaru*. *Sh* between two vowels, or with an *m* following, was apparently pronounced as *s* (cf. also *Pl.* 1 and 2). The root of *usazaku* is נוך or נוק, II R. 30, 42, *e*, *f* (Jensen, *Kosmologie*, p. 339), not מצן (Scheil, *l. c.*, p. 103). It means "to be in motion, to move" (intr.). Cf. *naziktu*, II R. 23, 65, *e*, *f*, synon. of *daltu*, "door" = "that which moves (on a hinge);" *izzuk mulmullu* (Creation Tablet IV, 101), "the spear quivered." III_1 = "to move (trans.), to remove." This meaning is supported by parallel passages, as V R. 33, col. VIII, 42: *mannu sha itâbalu* (Jensen, in Schrader's *K. B.*, III, Part I, p. 152, note 3) *shumishu kîma shumi'a ishaṭaru*, "Whoever carries off (the tablet) and writes his name as my name." **L. 16.** The sign *gish*—dialect. for MU—signifies apparently *zikru* (Sargon Cyl., l. 50). Cf. Jensen, *Z. A.* I, p. 184. **L. 23.** *lisuḫâ* = *lissuḳâ*, נסח. Cf. Pl. 2, 20 (Pl. 1, 21: *lissuḫû*). For the *â* of the 3d pers. masc. plur., cf. Del. *Gram.*, § 90, c. **L. 26.** *li-il*(sic! = Brünnow, *l. c.*, 4847)*-gu-da* = *lilḳuṭâ*, cf. Pl. 2, 23. Pl. 1, 24 reads in its place *li-il-gu-tu* = *lilḳuṭû*, לקט. Cf. the corresponding Sumerian phrase at the close of the inscription of *Kadashman-Turgu*, Pl. 24; No. 63. **L. 28** is uncertain. The second character I regard as DI = *alâku*, and the third character, *kat* (Brünnow, *List*, 2701), a phonetic compliment. According to the scribe's method of writing, we should expect but one word on this line. **L. 29.** *a isir* = *â îshir*, Præt. I_1 of ישר. Cf. III R. 61, No. 2, 14: *alkat mâti lâ ishshir*, "the business (*Handel und Wandel*, Del.) of the land may not prosper."

[2] Thus, correctly, Scheil, *l. c.*, p. 105. The second is considerably younger.

[3] Also the features of the king *Anu-banîni* of Lulubi, carved together with the inscription in the rock, are manifestly Semitic.

[4] Scheil translates "*cette tablette*," but adds "cette" only from the general context.

[5] Perhaps it is to be read directly *shu*, and the two characters must be transcribed as *shu-am*. Cf. also Amiaud, in *Z. A.* II, p. 292.

[6] No. 73 in Amiaud et Méchineau, *Tableau comparé*, must be corrected accordingly.

reads *li-il-ku-du* = *lilkutû*. The second inscription (*stèle de Cheikh-Khân*) is, in my estimation, misunderstood by Scheil. There is no question of "restoration,"[1] but of the first erection of the image.

To this, the already known material touching the oldest Semitic period, has come now to be added Pl. 1–7. The above remarks upon the texts of the kings of Guti and Lullubi open the way for a better understanding of these new texts. The following notes supply all that still needs to be added.

The excavations have brought to light six inscribed objects of Sargon I: two brick stamps of baked clay, the fragment of a third, and three door sockets. The brick stamps[2] are made from the same mould. The inscription (Pl. 3, No. 3) reads as follows: 1. *Shar-ga-ni-shar-âli* 2. *shar* 3. *A-ga-de*^{ki} 4. *bâni* (BA-GIM) 5. *bît* 6. ^{ilu}*Bêl*, "Shargânisharâli, king of Agade, builder[3] of the temple of Bêl." Judging from their appearance, these brick stamps were never practically used, but were presented by Sargon as temple-offerings to Bêl in commemoration of his work; or perhaps they were placed in the corners of the structure erected by him, as was the case with the later clay cylinders.[4] That others which were of the same form as these were used for stamping bricks can neither be proved nor denied.[5]

Of greater importance are the door sockets, which contain the longest inscriptions of Sargon thus far known. Two of these are exactly alike in their contents (Pl. 2). The inscription of the third (Pl. 1) differs somewhat. Pl. 2, as the more important, reads as follows: 1. ^{Ilu}*Shar-ga-ni-shar-âli* 2. *mâr Itti(-ti)-*^{ilu}*Bêl* 3. *da-num* 4. *shar* 5. *A-ga-de*^{ki} 6. *ù* 7. *su*[6]*-ú-la-ti* 8. ^{ilu}*Bêl* 9. *bâni* 10. *E-kur*[7] 11. *bît* ^{ilu}*Bêl* 12. *in Nippur*^{ki}, etc.,[8] "Shargânisharâli, son of Itti-Bêl, the mighty king of Agade and of the dominion(?) . . . . of Bêl, builder of Ekur, temple of Bêl in Nippur." From this text we learn the interesting fact that Sargon's father was Itti-Bêl ("With-Bêl").[9] Inas-

[1] *ushziz* never signifies "to restore," but "to set up;" *ênuma lâban*, as Scheil transcribes, could never be (Grammar!?) the Babylonian or even Lulubitic equivalent for "alors qu' elle tombait."

[2] The cuneiform characters have been executed in relief, and are larger at the base than at the top. My copy gives the exact size of the characters at the base, while the photographic reproduction illustrates the size at the top.

[3] *Banû* means to build something or to build at something that already existed, *i. e.*, to add to it or to restore it if it was in ruins. All that we can say of Sargon is that he was a builder of the temple, but not its first builder.

[4] "One of the cylinders from Babylon, now in the British Museum, was not found, as I was able to learn from the man who discovered it, in a corner, but in a niche in the side of a long wall" (Peters).

[5] Winckler's doubts (*Gesch.*, p. 26) are dissipated by the evidence of the phrases *bâni bît Bêl* and *bâni Ekur bît Bêl in Nippur* (Plates 1–3).

[6] Brünnow, *l. c.*, 802 (Jensen). The significance of *sûlati* (or plur. *sûlâti?*) is not certain. Is סֹלְלָה (Jer. 33, 4) to be compared?

[7] This—not *E-shar* (Delitzsch, *Gesch.*, p. 33)—was the name of the temple of Bêl in Nippur. Cf. Jensen, *Kosmologie*, pp. 186 *seq.*, 196 *seq.*

[8] For the rest, cf. pp. 10, 13, 14.

[9] Perhaps shortened from *Itti-Bêl-balâṭu*, "With Bêl is life" (Strassmaier, *Nabon.* 466, 13; *Cambys.* 373, 10). Cf. the similar formations *Itti-Marduk* (*-Nabû*, *-Shamash*, *-Gula*, etc.)*-balâṭu* in the Contract literature.

much as the latter does not bear the title of king, we may[1] see therein a confirmation of the legend[2] of Sargon, l. 2, *a-bi ul i-di aḫu abi-ia i-ra-mi sha-da-a*, "my father I know not, whereas the brother of my father inhabits the mountain," viz., that Sargon, being of an inferior birth on his father's side, was a usurper.

My use of *Shargâni-shar-âli* as identical with *Shar-gi-na*—known from the inscriptions of Nabûna'id as the father of Narâm-Sin—requires a word of explanation. Sayce,[3] Hommel[4] and Tiele[5] have never called in question the identity of the two names, reading the name of our king as *Shar-ga-ni*, and regarding *shar âli* as his first title. Similarly Pinches distinguished between the name and the title, at first[6] interpreting the latter with Ménant as *lugal-lag̔*, "the messenger king," but afterwards[7] with Hommel as *shar âli*, "king of the city." Ménant[8] and Oppert, on the contrary, believe that *Shar-ga-ni-shar-luḫ* (Ménant), or *Shar(Bin)-ga-ni-shar-imsi* (Oppert[9]), or *Shar(Ḫir, Bin)-ga-ni-shar-ali* (Oppert[10]) is to be regarded as one word, containing only the name of the king. More recently Winckler,[11] adopting Oppert's view, reads the name *Shar-ga-ni-shar-maḫâzi*. He considers the identity of this name with Sargon as an open question, whilst Oppert holds it to be simply an *inadmissible plaisanterie*.[12] It is not clear to me what induced Oppert to regard *Shar-ga-ni* as identical with *Bin-ga-ni*.[13] The syllabic value of *bin* for the sign SHAR is unproven, and in itself improbable.[14] On the other hand, I share the view of Oppert-Ménant in

[1] This conclusion is very probable, but not absolutely certain, as the title of king is very frequently omitted when the names of the fathers of Cassite kings are referred to, although they are known to have been "kings."

[2] Although evidently containing history interwoven with legend, it is nevertheless historically important, as giving expression to the Babylonian conception of the history of the ancient Sargon. Its value increases in proportion as we find in it statements which are proven from other sources to be correct. Incidentally, it may be remarked that on account of the mention of the father's brother in the "Legend," and because of Sargon's own statement concerning Itti-Bêl, the clause *abî ul idi* can only be regarded as meaning that Sargon did not know his father personally, since the latter was dead (Tiele, *l. c.*, p. 114), or for various reasons was compelled to keep himself in concealment.

[3] Cf. *e. g.*, *R. P*². I, p. 5

[4] *l. c.*, p. 302 *seq.*

[5] *l. c.*, p. 488, note 1.

[6] *P. S. B. A.* VI, pp. 11–13, 68 *seq.* Cf. V, pp. 8, 9, 12; VII, pp. 65–71. *Trans. S. B. A.* VIII. pp. 347–351.

[7] *P. S. B. A.*, VIII, pp. 243 *seq.*

[8] *Recherches sur la Glyptique orientale*, p. 74. *P. S. B. A.* January 5, 1884.

[9] *Collection de Clercq.*, No. 46, p. 50.

[10] *Z. A.* III, p. 124.

[11] *Gesch.*, pp. 39, 327, and Schrader's *K. B.* III, Part 1, p. 101 **. Cf. *Unters.*, p. 44 *seq.*

[12] *Z. A.* III, p. 124. Ibid.: "*quoique roi d'Agade, il n'est pas plus Sargon, que les empereurs Louis et Lothaire ne sont un même personnage.*" Winckler's article in *Revue d' Assyriologie* II (quoted in *Unters.*, p. 79, note 4), was unfortunately not accessible to me.

[13] In the name *Bi-in-ga-ni-shar-âli* on a seal cylinder, published by Ménant, *Glyptique* I, Pl. I, No. 1. Cf. Winckler, *Altbabylonische Keilschrifttexte* (quoted as *A. K.*), No. 66.

[14] Even if it was proved that *SHAR* has the value of *bin* in a few cases, it would be utterly impossible to give the character this exceptional value in a Semitic word list (V R. 41, l. 29, *a*, *b*). Cf. p. 18, note 4.

regard to the close connection of these three words as constituting the name of the king, and read accordingly *Shargâni-shar-âli* as one word. For, as Oppert properly states, it is impossible to read the name simply *Shar-ga-ni*, inasmuch as, according to the parallel passages of the oldest Semitic cuneiform texts, in this case we should expect the two parts (*Shargâni* and *shâr-âli*) to be separated by a line. Only individual words, or two expressions very intimately connected,[1] as "son of Itti-Bêl," "temple of Bêl," "in Nippur," are written together without this separating line.[2] Titles are not considered to stand in such close connection with their antecedent proper names.

But, contrary to the view of the two French scholars, I maintain the identity of Sargon and *Shargâni-shar-âli* for the following reasons:

1. By the side of the long names of kings and private individuals we find—at least in the last two thousand five hundred years of Babylonian history—abbreviated forms in use. The lists of kings and the contract tablets, not to mention other passages, furnish ample proof. Cf. *e. g.*: *Ki-an* (List b[3]) with *Ki-an-ni-bi* (List a, Rev.); *Kir-gal* (List b) with *Kir-gal-dara-bar*; *A-dara* (List b) with *A-dara-kalam-ma*; *Bibe* (List b) with *Bi-be-ia-shú*[4] (Pl. 26, No. 70); *Kab-ti-ia abil-shu sha Tab-ni-e-a*,[5] with *Kabti-ilâni-Marduk abil-shu sha Nabû-tab-ni-u-ṣur*,[6] among hundreds of similar examples.[7] It is therefore highly probable that at some future time we shall find the abbreviated form Shargâni even on Sargon's own monuments.

2. It was especially to be expected in the case of a king famous above all others, and who so early became the hero of popular story, that the longer name should so[8] be abbreviated in the mouth of the people, and, finally, when it had ceased to be intelligible, explained after the method of 'folk etymology',[9] as *Sharru-kênu*, "the true king." Moreover, Pinches[10] has pointed out, by comparison of Sumer. *kurgina* = Assyr. *kurkanû*, *gishkin* = *kishkanû*, that the sign GI (*ge*) was originally pronounced as *ga*, and that the Hebr. סַרְגוֹן represents this older pronunciation.[11]

[1] In this respect the writer of the *stèle de Zohâb* is freer. Cf., however, *sha duppa*, which is always written on one line even in the Sargon inscriptions from Nippur and in that of the king of Guti.

[2] Cf. Pl. 1, l. 3, 11, 24; Pl. 2, l. 1, 2, 11, 12, 23; Pl. 3, No. 3, l. 1; No. 4, l. 1, 3.

[3] Winckler, *Unters.*, p. 146, col. I, 4. For List a, cf. ibid., p. 145.

[4] Hilprecht, "Die Ergänzung der Namen zweier Kassitenkönige," in *Z. A.* VIII, in print.

[5] Strassmaier, *Nabon.* 133, 4.

[6] Strassmaier, *Nabon.* 132, 4. Cf. Peiser, *Aus dem Babylonischen Rechtsleben* I, p. 11.

[7] The same principle of abbreviating names in everyday use occurs among nearly all ancient nations. Cf. *e. g.*, Erman, *Ægypten und Ægyptisches Leben im Altertum*, p. 233; also the Hebrew dictionaries; Fick, *Die griechischen Personnenamen*; O. Crusius, *Neue Jahrbücher*, 1891, pp. 385–394: "Die Anwendung von Vollnamen und Kurznamen bei derselben Person." For the last two references I am indebted to my friend and colleague, Prof. W. A. Lamberton.

[8] *Shargâni*, "the powerful." See p. 18, note 4.

[9] Hommel, *Gesch.*, p. 301.

[10] *P. S. B. A.*, VII, p. 67 *seq.*

[11] Cf. Hommel, *l. c.*, p. 303.

3. It is absolutely impossible to regard Sargon, father of Narâm-Sin, as "perhaps an invention of legend."[1] But were he one of the best known and mightiest rulers of the olden time,[2] it was to be expected that some monuments of his would be found in the thorough exploration of the ruins of the temple at Nippur, where the greatest number of texts of his time[3] ever found has been brought to light. Where inscriptions of his less known son Narâm-Sin, and of the hitherto altogether unknown Âlusharshid, have been discovered, it was *a priori* probable that inscriptions of *Shargīna* = *Shargēna* = *Shargâni(a)* would also come to light. Therefore the very absence of the name in the inscriptions there discovered is, in itself, a proof that the ancient king whose name commences with *Shargâni*, and who is represented by six inscriptions, is no other than Sargon, the father of Narâm-Sin. From this it follows naturally that the later *Shargēna* was merely an abbreviation of *Shargâni-shar-âli*.

According to Oppert, the name signifies "mighty is the king of the city."[4]

There were also found in Nippur two brick stamps of Narâm-Sin, son of Sargon I. Both contain the same legend. The moulds, however, that were used in making them differ slightly in size and shape. The inscription reads: 1. *Ilu Narâm-ilu Sin* 2. *bâni* 3. *bît ilu Bêl*, "Narâm-Sin, builder of the temple of Bêl." If we may base an argument on the place in which the stamps were found, as to the location of Narâm-Sin's building, we might conclude that he built a shrine immediately on the canal south from the *Ziqqurratu*, whilst his father confined himself in his building to the east side of the temple platform. In any case, from the contents of the

[1] Winckler, *Gesch.*, p. 39.

[2] As is proved by the inscriptions of Nabûna'id, where he is called "king of Babylon", by the "Legend of Sargon," the Tablet of Omens IV R. 34, and the mention of his name in the List V R. 44, 18, *a*, *b*. Hommel, who reads erroneously *Lugal-girinna* (*l. c.*, pp. 301, 307, note 4) in the last quoted passage, distinguishes Sargon of the list as Sargon II, c. 2000 B.C., from the ancient Sargon I. His arguments are not convincing (cf. also Winckler, *Unters.*, p. 45, note 2). It is especially "the historical background of the work"—the mention of Elam, Guti, etc., at such an early period, which is the most valuable evidence for the high antiquity and reliability of the statements contained in the astrological work. Cf. my remarks in connection with the inscriptions of the king of Guti and Âlusharshid.

[3] Six inscriptions of *Shargâni-shar-âli*, two of *Narâm-Sin*, and sixty-one inscribed vases (or fragments) of Âlusharshid.

[4] *Z. A.* III, p. 124. Cf. V R. 41, 29 *a. b.*: *shar-ga-nu* = *dannu*. *Shargânu* is a noun formation in *ân* (Delitzsch, *Gram.*, § 65, No. 35) from a root *sharâgu*, which seems to mean "to be powerful, mighty." Cf. the Hebr. proper name שְׂרוּג. Likewise the names *Bingâni-shar-âli* and *Âl-usharshid* contain the formative element *âlu*. There are reasons for identifying this *âlu* (*Âlu*) with *Âlu ki*, used as an ideogram for "Babylon" by Nebuchadrezzar II (misunderstood by Delitzsch, *Wörterbuch*, p. 6). Cf. Hilprecht, *The Sunday School Times*, 1892, No. 20, p. 306 *seq.* Nebuchadrezzar uses even *maḫâzu* alone (*urbs*) for "Babylon." Cf. *e. g.* V R. 34 (*Z. A.* II, p. 142–44), col. I, 13: *zanân maḫâzi*, "to adorn the City" (*i. e.* Babylon, not "*die Städte*," Winckler in Schrader's *K. B.* III, Part 2, p. 39). For the use of Âlu without *ki*, cf. below *Kish* (*Kishshatu*).

inscriptions of Sargon and Narâm-Sin it follows that the dominions of both included Nippur.[1]

The list of ninety-two garments, Pl. 6, was found near the inscriptions of Narâm-Sin. As it is written in Semitic (cf. l. 6, *rabâtum*), and as, paleographically, there is no objection to such a conclusion, it belongs probably to Narâm-Sin, or, in any case, to one of the earliest Semitic kings of Babylonia.

In this connection, I call attention to the interesting and important fact that the fragment of another vase (or probably of several) was discovered in the same deep-lying stratum as the inscriptions of Sargon and Âlusharshid, and close by them. This fragment[2] contains the statement that "*En-te(men)-na*, patesi[3] of Shirpurla," presented the vase to Bêl of Nippur. When to this we add that a vase of Narâm-Sin,[4] and another of Âlusharshid, as I have been informed, was found in Tello, we may safely conclude: 1. That the dominion of Sargon,[5] Narâm-Sin and of their immediate successors (or predecessors[5]) extended also over the whole of South Babylonia[6] (at any rate, as far as Shirpurla[7]). 2. That the chronology of the oldest Semitic rulers of Babylonia is approximately the same[8] as that of the earliest patesis of Shirpurla. 3. That the "kings of Shirpurla" are earlier than Sargon (or Âlusharshid[5]). It was apparently Sargon I or Âlusharshid who put an end to the independence of the kingdom of Shirpurla. This is not the place for a detailed statement of all my reasons. They will be found in full elsewhere.

To the early Semitic rulers of Babylonia already known must now be added, in consequence of the discoveries at Nippur, King URU-MU-USH, as his name is written. Not less than sixty-one fragments of different vases of his have been excavated from the temple.

As to the material of the vases cf. Table of Contents. The fact that they were found close to the monuments of Sargon, that like them they are written in Semitic, that the phraseology of Pl. 4, l. 11, 12 is very similar to lines 6, 7 of the vase inscrip-

[1] Cf. above, p. 15, note 5, and p. 25, note 3.

[2] It will be published in Vol. I, Part 2.

[3] I hold that the change of the title of *lugal* into *patesi* in the case of the princes of Shirpurla is an indication of their political dependence (Hommel, *l. c.*, p. 296). Jensen's view (Schrader's *K. B.* III, Part 1, pp. 6–8) is somewhat different.

[4] According to Oppert. Cf. Hommel, *Gesch.*, pp. 299, note 1, 309.

[5] See my remarks in connection with the texts of Âlusharshid.

[6] Cf. Hommel, *l. c.*, pp. 296, 311.

[7] Winckler's suggestion that Shirpurla is not identical with the modern Tello or part of these ruins (*Gesch.*, pp. 24, 31, note 1, 44, 326), but that it lay in North Babylonia, is quite improbable, to me even impossible.

[8] In this I slightly differ from Hommel (*l. c.*, p. 296), who places Sargon and Narâm-Sin a little later than the oldest patesis of Shirpurla.

tion of Narâm-Sin, that paleographically they show the characteristic features of the inscriptions of Sargon and his son, all this points to the first half of the fourth millennium as the approximate date when they were written. As the language of the inscriptions is Semitic, I regard the name of the king also as Semitic and read tentatively *Âlu-usharshid*,[1] *i. e.*, "He (some deity) founded the city."[2]

The discovered inscriptions of this king may be classed in four groups, consisting of thirteen, eleven, six and three lines respectively. Only three of the three-line legends[3] have been preserved intact. Though not a single complete text of the six-line inscriptions has been excavated, yet the faint traces to be seen in the third-line of Pl. IV, No. 13, and the space left for the restoration of the text, justify my reading of Pl. 5, No. 6, l. 1–3. The fragment reproduced on Pl. 5, No. 10, is the only remnant of an eleven-line inscription found at Nippur. It is in all respects similar to the thirteen-line inscriptions, with this difference only that l. 11, 12 of the latter, *in namrak Elamti* ^{ki}, were omitted. The inscription of thirteen lines has been reconstructed from eleven fragments, three of which (Pl. III, Fragm. 8891, 8892, a, b) belonged to a large dolomite vase and formed the basis of my text. Eighteen fragments of all the excavated vases may confidently[4] be referred to this group. The long inscription, of which some of the shorter ones are possibly abbreviations,[5] reads: 1. *A-na* 2. ^{ilu} *Bêl* 3. *Âlu-usharshid* 4. *shar* 5. *Kishshatu* 6. *ì-nu* 7. *Elamtu* ^{ki} 8. *ù* 9. *Ba-ra-'-se* ^{ki} 10. *inîra* 11. *in nam-ra-ak*[6] 12. *Elamti* ^{ki} 13. *iddin* (A-MU-

[1] Cf. Brünnow, *l. c.*, 5032, 5068.

[2] Cf. Hilprecht, *Z. A.* VII, p. 315, note 1, and Pinches, *The Academy*, September 5, 1891, p. 199. Even if the name be transliterated *Urumush*, it may be Semitic. In this case the *Orchamus* of Ovid (*Metam.*, 4, 212) offers itself for comparison.

[3] In spite of their identical contents I reproduced two of them (Pl. 5, Nos. 7 and 8), because of the slight difference in the form of the characters USH and *sharru*, and because we do not possess a superabundant supply of texts dating from that ancient period to which they belong. The sign published on Pl. 5, No. 9, and resembling the Old Babylonian character for *ilu*, "god," is found on the bottom of a third vase of the three-line group, and is, no doubt, merely a "trade-mark."

[4] I include here only those fragments of which portions of l. 5–13 have been preserved. Some of the other fragments, however, probably belong to the same group.

[5] Necessary because of limited space.

[6] This word has been variously translated. Tiele (*Gesch.*, p. 115) and others before and since changed *namrak* into *Apirak*, a city mentioned on the tablet of omens, col. II, 12–14. Hommel (*Gesch.*, pp. 279, 309) translates it "polished work," whilst Winckler (*Gesch.*, p. 38) is content to render it simply "work." But all this is mere guess work. To my knowledge, the word has been found thus far only in three passages, in the above text of Âlusharshid, on the vase of Narâm-Sin and in Gudea B, col. 6, 66. In the last passage we read l. 64–69: ^{gish} KU ^{uru}*An-sha-an Nima* ^{ki} *mu-sig nam-ra-aga-bi* ^{dingir}*Nin-gir-su-ra E-ninnû-a mu-na-ni-tur*, "With (his) weapon he smote the city of Anshan in Elam, brought its spoil into Eninnû to Ningirsu." Cf. Jensen (*K. B.* III, Part 1, pp. 38, 39) on this passage. The latter's hesitation about the reading *Nima* ^{ki}, "Elam" (exactly so written above), and the meaning of *namrak* is unnecessary. As early as eight years ago, Amiaud, with his wonted insight, conceived the correct meaning of the word (*Z. K.* I, p. 249). Whether it is Sumerian or Semitic remains to be determined. As we do not possess long

SHUB),[1] "Âlusharshid, king of Kishshatu, presented (it) to Bêl from the spoil of Elam, when he had subjugated Elam and Bara'se."

The inscription is of historical importance. We learn from it, that King Âlusharshid subdued Elam and the country of Bara'se, doubtless in close proximity to it,[2] and that in the booty he carried off to Babylonia a number of costly marble vases. Part of them he dedicated to Bêl of Nippur, and part, perhaps, to Shamash of Sippara,[3] after first having engraved upon most[4] of them in beautiful clear-cut characters his name and the occasion of the gift. The inscription suffices to show that Âlusharshid was a mighty ruler, who in courage and adventurous spirit was not second to Narâm-Sin. But it also offers most welcome material for determining the extent of the dominion of the oldest Semitic rulers. It furnishes additional support to Tiele's view (*Gesch.*, p. 114), and at the same time proves that Winckler's conception of the beginning of the North Babylonian history and of the extent of Sargon's empire (*Gesch.*, p. 38) is incorrect. Winckler proceeds upon the erroneous supposition that the deeds of Sargon, as reported in the tablet of omens and in the "legend," are purely legendary. Hommel also (*Gesch.*, p. 306 *seq.*) is hampered by similar prejudices. That Narâm-Sin was in the possession of South Babylonia is demonstrated by his building in Nippur (*bâni bît Bêl*), and by his vase found in Tello, and is furthermore established beyond all doubt by his successful operations in Magan,[5] which, according to Winckler, was situated on the eastern boundary of Arabia. A vase of the Semitic king of Guti,[6] belonging to this same ancient period, which was probably carried by a victorious Babylonian king as trophy to Sippara, points to the extension of the power of the oldest North Babylonian rulers

descriptions of campaigns in Sumerian, it cannot be surprising that the word does not occur otherwise in Sumerian inscriptions, which deal mostly with religious affairs and accounts of buildings. In favor of a Semitic etymology, to which I incline, it may be said: (1) That the word "looks very much like an original *m*-formation of a root מרך" (Jensen) and (2) that it is twice found in the Semitic inscriptions of the oldest North Babylonian rulers.

[1] It is not to be read *a-mu-ru* and to be derived from *amâru* with the meaning of "*ersehen*" (Hommel, *Gesch.*, p. 302), *i. e.*, "to dedicate" (Pinches, *Trans. S. B. A.* VIII, p. 350). Cf. Amiaud, *Z. A.* II, p. 296, and Jensen in Schrader's *K. B.* III, Part 1, p. 26, note *0. For *shub* = *nadânu* = *nadû* (נדה, cf. נֵדֶה, "gift," Ezek. xvi. 33), cf. Tallquist, *Babylonische Schenkungsbriefe*, p. 9.

[2] Nothing more definite can be said at present. It is, perhaps, to be read *Para'se*. Cf. the name of the mountain *Ba-ti-ir* (*stèle de Zohâb* I, col. I, 7), which Scheil (*l. c.*, p. 104) correctly identified with the mountain *Pad(d)ir* (*Shamshi-Rammân* II, col. II, 7).

[3] According to Pinches Jensen, inscriptions of Âlusharshid have also been found in Sippara. Cf. *The Academy*, September 5, 1891, p. 199, P. S.

[4] A number of vases of the same high workmanship and found among them were without inscriptions. Cf. below, p. 30.

[5] I. R. 3, No. VII, l. 7, *namrak Magan*, "plunder of Magan."

[6] Cf. p. 12 *seq.*

further northward. The inscriptions of Âlusharshid testify to his supremacy over the South,[1] and to his victories in the East and North-East of Babylonia. In view of all this, I regard it as impossible to question the historical character of the statements of the tablet of omens relative to Narâm-Sin. Since we know that about that time a Semitic population dwelt in the northern and northeastern countries of Guti and Lulubi,[2] whose kings wrote inscriptions on rocks and vases in a dialect entirely identical with the Babylonian, it can no longer seem strange that Narâm-Sin took the Semitic king *Rîsh-Rammân*, of Apirak, prisoner. It is evident, however, that Apirak, which by its termination forcibly recalls names like A(E)shnunak,[3] is to be sought in the North-East[4] of Babylonia rather than in the South.[5] If the credibility of the tablet of omens is therefore established as far as Narâm-Sin is concerned, we are no longer at liberty to call in question what it relates concerning Sargon I, unless more solid objections than have heretofore been raised, be brought against it. With Tiele, therefore, I regard as facts what Winckler describes as fiction, viz., that Sargon I subjugated nearly the whole world known to him, or in other words, "the four quarters of the earth."[6]

But how is it that whilst Sargon always bears the title *sharru dannu shar Agade* or *dannu shar Agade* or only *shar Agade*,[7] both in the legend and in his own inscrip-

[1] Including Lagash. Cf. p. 19.

[2] This fact argues in favor of a migration of the Semites into Babylonia from the North. Cf. the "legend of Sargon," according to which his uncle dwelt in the mountains, and he himself was carried down the river in an ark made of reed. Cf. also Winckler, *Gesch.*, p. 141.

[3] Pognon found there Semitic inscriptions written by *patesis* of Ashnunak. Nothing can be said with certainty as to the exact date of these texts, but they seem to belong to the second millennium B. C. Cf. Pognon, *Quelques rois du pays d'Achnounnak*, read at the *Académie des inscriptions et belles lettres*, March 18, 1892. On this country see further Delitzsch, *Paradies*, p. 230 *seq.; Kossäer*, p. 60 ; and also Jensen in Schrader's *K. B.*, Part I, p. 137, note⁰.

[4] Hommel is on the right track (*Gesch.*, p. 310, note 1). His reading *A-ma-rak*, however, has neither support nor probability.

[5] Delitzsch, *Paradies*, p. 231, "*ziemlich südlich zu suchen.*"

[6] I regard also Sargon's campaign in the West, to the Mediterranean Sea and to Cyprus, as historic facts. The cylinder of Narâm-Sin's servant found at Cyprus, and now in the Metropolitan Museum of New York (cf. Sayce, *Trans. S. B. A.* V, p. 441 *seq.*), has, however, no direct bearing upon the whole question. Through the kindness of Prof. Isaac Hall, Curator of the Museum, I obtained an accurate impression of the cylinder, to which, for paleographic reasons (observe, *e. g.*, the form of the character *ra*), I cannot assign an earlier date than c. 2000–1500 B. C. The pictures on it also point to a more recent date. But the cylinder is undoubtedly no modern forgery (Hommel, *l. c.*, p. 309).

[7] Nabûna'id calls him, for apparent reasons, *shar Bâbili*. It is in itself not impossible that there were kings of Babylon at some time in that ancient period. For the place where the vase of Narâm-Sin was found by the French expedition, the tablet of omens (I, 7–11, cf. my restoration of this passage below, p. 26) and the occasional mentioning of Babylon (under another name) in the Sumerian inscriptions of the kings and patesis of Shirpurla clearly show that Babylon not only existed at this early time and belonged to Sargon's kingdom, but that it even had already obtained considerable prominence (cf. below, p. 26). Cf. however, Winckler, *Unters.*, p. 76 *seq.*, and Lehmann, *Shamashshum-ukîn*, p. 96, note 4.

tions, his immediate successor, Narâm-Sin, styles himself *shar kibrat arba'i*, and Âlusharshid and MA-AN-ISH-TU-SU[1] even *shar Kishshatu?* This question is closely connected with the other, What do the last two titles mean? It is impossible for me to enter here into as full a discussion of this question as its importance demands. I therefore content myself for the present with giving the results of my investigations. As I am now considering the meaning of these titles in the earliest times only, I naturally exclude their use with the later Babylonian and with the Assyrian kings.[2]

I. As to the Old Babylonian title, *shar Kishshatu*, we have been accustomed to follow Winckler,[3] and to regard it as simply the equivalent of the later *shar kishshati*, "king of the world."[4] This identification, however, is not proved. On the other hand, it is worthy of note, (1) that supposing Âlusharshid lived after Narâm-Sin, and even supposing further that he founded a new dynasty, it would still be matter for astonishment that he should exchange a title, that was not only satisfactory to Narâm-Sin, known as a great conqueror, but was in itself sufficiently significant, for the synonymous *shar kishshati*, "king of the world;"[5] (2) that no later Babylonian king, before Merodachbaladan I, not even the powerful Hammurabi, bears this title, though many of them apply to themselves the title *shar kibrat arba'i;* (3) that Winckler's theory, which sees in Harran the original seat of the *sharrût kishshati*, is improbable for the later Babylono-Assyrian time, and altogether out of question for

[1] Winckler, *A. K.*, No. 67. Paleographic reasons, the Semitic language of the inscription and the title *shar Kishshatu*, establish for this king a date not only earlier than 2000 B. C. (Winckler, *Gesch.*, p. 155), but even earlier than 3000 B. C. He is to be classed with Âlusharshid. The white marble duck (Norris, *On the Assyrian and Babylonian Weights*, Pl. 2, No. 2), bearing the name of *Nabû-shum-libur shar Kishshatu*, remains without consideration here, as I do not feel at liberty to base any paleographic conclusions on the cuneiform text as it is published there.

[2] I hope to treat the whole question in another place. That we may understand correctly the meaning of this title in Assyrian, the following points must be examined more carefully: (1) Is the title simply to be regarded as borrowed from Babylonia (cf. *patesi*, temple names, etc.) and extended to cover Assyrian conditions, so that only the name is Babylonian, while its semasiological development is essentially Assyrian? (2) Or, in using the title, did the Assyrians claim the same right over the same district as the Babylonians, *i. e.*, suppose that in Babylonia a claim was thereby expressed to Harran (Winckler), did the Assyrians by their use of the phrase make exactly the same claim upon this city? (3) Or is there no connection between the Assyrian and the Babylonian title? These questions have hitherto not been answered sufficiently.

[3] *Mitteilungen des Akademisch-Orientalischen Vereins zu Berlin* I, p. 14.

[4] Cf. Jensen in Schrader's *K. B.* III, Part 1, p. 196, note 4.

[5] If we may draw any conclusion from the later customs of Babylonian and Assyrian kings, we rather expect that in the above given case, Âlusharshid, whose empire was scarcely smaller than that of Narâm-Sin, according to our present knowledge, would have been particularly anxious to adhere to a title which was connected by the Babylonian people with the name of a very powerful ruler, and regarded by the later kings as especially important. And *vice versa*, if Âlusharshid lived before Sargon and had founded a *sharrût kishshati*, "kingdom of the world," it would be strange that Narâm-Sin should have used *shar kibrat arba'i* instead, if the other title meant exactly the same.

the earliest period.[1] I therefore would propose another explanation of the title, viz., to regard *shar Kishshatu* (or *shar Kish*) as identical with *shar Kîsh*, "king of Kîsh."[2] In other words, I infer from this title that there was a kingdom of the city of Kîsh similar to those of Shirpurla, Agade, etc., at the earliest time of the Babylonian history. Two of its rulers are so far known; both wrote Semitic, and one of them at least possessed South Babylonia and defeated Elam. Whether these kings lived after the dynasty of Sargon, or whether they preceded it and were dethroned by Sargon, will be considered below. At all events, it will be well to separate the kings of Kîsh[3] from those of Agade. There is much in favor of the view that even in the Assyrian mind[4] the title *shar kishshati* was originally connected with the possession of Kîsh, where Tiglath-Pileser III offered sacrifices to the gods (II R. 67, 11).

II. But what does *shar kibrat arba'i* mean in the oldest Babylonian history? After Sargon had subjugated the Elamites,[5] thus fixing the natural eastern boundary of his projected great empire, he marched to the West, "subdued 'the land of the West,' conquered the four quarters of the world." The last part of the previous sentence, literally quoted from the tablet of omens, can in itself be interpreted as meaning (*a*) that "the four quarters of the world" lay still beyond "the land of the West," and therefore were geographically distinct from it, or (*b*) that the conquest

[1] Cf. also A. Mez, *Geschichte der Stadt Harrân in Mesopotamien*, p. 27.

[2] As I remarked above, I cannot state all the reasons for my theory here. At present it may suffice to give the following: (1) Cf. my restoration of IV R. 34, 7–11 below. (2) Cf. Delitzsch, *Paradies*, p.218 *seq.*, where it is stated that the Semitic Babylonians and Assyrians wrote this city also *Ki-shu* (and *Ki-e-ish*, Brit. Mus., 82–8–16, 1, col. I, 44, published by S. A. Smith, *Miscellaneous Assyrian Texts*, Pl. 26; cf. also the present volume, Pl. 8, No. 14, l. 7), and *Kish-sha-tu*, "according to a small unpublished vocabulary" (cf. *Paradies*, p. 230). (3) Cf. also the name of the ancient king, *Abil-Kîsh* ^{ki}, known from the fragment of a Babylonian chronicle (*Trans. S. B. A.* III, 372), and to whom Delitzsch (*Gesch.*, p. 72) correctly assigns the fourth millennium.

[3] I afterwards found that Jensen (*Schrader's K. B.* III, Part 1, p. 202, note), independently of me, translated "king of Kîsh" in the inscription of Manishtusu (Winckler, *A. K.*, No. 67). His reasons for so doing and his conclusions are both unknown to me.

[4] The facts that Rammân-nirâri, who defeated the Babylonian king, Nazi-Maruttash, near Kâr-Ishtar, is the first Assyrian ruler who bears the title *shar kishshati* (in the inscription of his son, Shalmaneser I, I R. 6, No. IV, l. 2); and further, that Tukulti-Ninib I, his grandson, who also claims the title, must have been in the possession of Kîsh, as he had captured even Babylon (*R. P.*^{2}, Vol. V, p. 111, col. IV, 2 *seq.*); and last, that neither Ashurdan I, nor Mutakkil-Nusku, nor even Ashur-rêsh-ishi has this title (III R. 3, No. 6, l. 1 and 8), deserve especial attention in connection with my hypothesis. Afterwards the ancient meaning of the title was lost, and *shar Kishshati*, "king of Kîsh," became *shar kishshati*, "king of the world" (which may, however, have been the very first meaning of the title before it was connected with Kîsh; cf. the development of the meaning *shar kibrat arba'i*).

[5] IV R.^{2} 34, col I, 1–3. I regard the arrangement of the individual deeds, related in the tablet of omens, as chronological. Among other reasons the account of Sargon's three expeditions against the West favors this view. It was also natural that the king, before marching to the West, should protect himself in the rear by subjugating the Elamites in the East, so that during his long absence no danger might threaten Babylonia from that quarter.

of "the four quarters of the world" is identical with his conquest of "the land of the West," or (*c*) that the conquest of "the four quarters of the world" followed as a result upon his subduing the West. In opposition to the first view is the fact that a kingdom of "the four quarters of the world" in the far West is nowhere else mentioned, that the phrase stands without the usual determinative *mâtu, âlu*, etc., and that this title was claimed by Babylonian kings even when they made no conquests in the West.[1] The identification of the "four quarters of the world" with "the land of the West" needs no refutation, as it has never been advanced, and in fact has no support. We can, therefore, only regard the conquest of "the four quarters of the world" as the result of Sargon's victories in the West, so that by the use of the title the claim is made to a quasi-worldwide dominion,[2] as has been correctly stated by Lehmann (*l. c.*, p. 94). And indeed, Sargon, after having conquered the West, was fully justified in the Babylonian sense of the word "world," in thus designating his large dominion. For, in order to subjugate the West, he was obliged, because of the Arabian desert, to march victoriously first to the North, then to the West and finally southward. The enemies in the East having been previously subdued, and South Babylonia being also brought under his sceptre,[3] he could indeed call a kingdom his own which was enclosed on all sides by natural boundaries.[4]

The city which had obtained the hegemony through Sargon's deeds was Agade.[5] For he calls it "my city" ("Legend," l. 26). It is the city in which he was shut up during the insurrection against him (IV R.^{2}, 34, col. I, 37). And furthermore, in all his inscriptions as yet found, he calls himself "king of Agade." But, if I understand the tablet of omens correctly, Agade does not appear to have been the capital of the empire of the four quarters of the world, as one would naturally have supposed. After Sargon had subjugated "the whole world," he regarded as his next work the building of a capital worthy of this grand empire. The account of this important work is evidently related in IV R.^{2}, 34, l. 7–10, a passage[6] unfortunately much mutilated and heretofore entirely misunderstood. After a careful comparison

[1] Against Tiele, *Gesch.*, p. 78.

[2] Tiele (*l. c.*, pp. 73, 78) concedes the possibility, indeed even the probability of this explanation, but adds, that the title may also have had an entirely different meaning (p. 73). But what else could it have meant with Sargon I?

[3] This is evident from his building in Nippur, and from the fact that even his son, who was less prominent than his father, extended his influence to Shirpurla. Cf. also the express statements of the "Legend."

[4] The Elamite mountains on the east, the mountains of Armenia on the north, the Mediterranean Sea (and Cyprus) on the west and the Persian Gulf on the south.

[5] In spite of all that has been said in support of *Agane*, I regard this reading as improbable (cf. my remarks on *Gande*, p. 28). Lehmann's statements (*l. c.*, p. 73) prove nothing against *Agade*. More as to this in another place.

[6] For recent translations cf. Hommel, *Gesch.*, p. 305, and Winckler in Schrader's *K. B.* III, Part 1, p. 102 *seq.*

of the text as given in the first and second editions of IV R.,[1] I transliterate and restore the passage as follows: *Shar-ge-na sha ina SHIR an-ni-i Kish-shu* [[*ki*2]] *Bâbilu* [*ki*] *i*-[*shú*-][3] *shum-ma eprê sha* ([4] *shal-la bâbu TU-NA* [4]) *is-su-ḫu-ma* . . . . [*ina lime?*]-*tu A-ga-de* [*ki*] *âlu i-bu-shu-ma* [UB-DA][5]-[*ki*] *shum-shú im-bu-u* . . . . [*ina lib-*] *bi u-she-shi-bu*, "Sargon, who under this omen brought sorrow upon Kîsh and Babylon, tore away the earth of . . . . and built a city in the vicinity of (or "after the pattern of"?) Agade, called its name 'place (city) of the world,' and caused the inhabitants of Kîsh and Babylon (?) to dwell there."

I infer from this (*a*) that Kîsh and Babylon existed as prominent cities already in the time of Sargon I, as this great ruler deemed it necessary to render them harmless; (*b*) that the dynasty of Kîsh was overthrown by Sargon I,[6] and that therefore Âlusharshid and Manishtusu are to be placed before Sargon I;[7] (*c*) that the reason why the vases of Âlusharshid, all badly broken, were found lying close by the comparatively well-preserved monuments of Sargon, but not by those of Narâm-Sin, is that Âlusharshid apparently ruled before Sargon, not after Narâm-Sin.

The question arises, Which city corresponds in later times to that built by Sargon "in the vicinity (?) of Agade," and with which the title "king of the four quarters of the world"[8] was associated? There are reasons for identifying it with Kutha, as Winckler[9] does. But stronger arguments seem to point to Ursagkalama[10] with its famous temple, "the mountain of the world," (always mentioned in close connection with Kîsh, the probable seat of the *sharrût kishshati*), as being identical with "the city of the world"[11] founded by Sargon I.

[1] This important text seems to have suffered still more since its first publication by George Smith in IV R.[1], as a comparison with Pinches' new edition clearly shows. Had all the differences between the first and second editions of the text, brought about by a decomposition of the tablet, been carefully noted, it would have been of great value, as the first edition is not always accessible to students.

[2] Cf. V R. 12, No. 6, 50; II R. 52, 67 *c*: *Ki-shu* (cf. above, p. 24, note 2). Perhaps *ki* is wanting, and *u*, "and," is to be substituted.

[3] This is the most probable reading, according to the traces in IV R.[2]. Cf. *K.* 3657, col. I, 9 (*i-shú-ush*), and IV R.[2] 1,* 42, *a*, "the sickness which brings woe upon the country" (*i-ash-sha-shú*).

[4] These five characters are not quite clear to me, though it is evident that Sargon purposely destroyed something.

[5] The two wedges beginning the character UB are clearly to be seen in IV R.[1], and the last two wedges of DA still remain in IV R.[2]. More than two characters cannot have stood there. For the meaning of *UB-DA*, without *arba'i*, cf. Jensen, *Kosmologie*, p. 167.

[6] For various other reasons the city kingdom of Kîsh cannot be placed after Sargon I.

[7] Paleographical reasons also favor this chronological arrangement of the two dynasties. I reached my conclusion after the plates in question were printed. Pl. 4–5 and III–V are to be placed before those of Sargon I and Narâm-Sin.

[8] It is quite possible that monuments of Sargon may yet be found, on which he calls himself "king of the four quarters of the earth."

[9] *e. g.*, *Gesch.*, pp. 31, 33.

[10] For this reading cf. Jensen in Schrader's *K. B.* III, Part 1, p. 22, note 5.

[11] Cf. Winckler's remarks, *l. c.*, p. 33, in connection with "*Charsagkalama*."

THE DYNASTY OF ISIN.[1]

Three kings of this dynasty were among the builders of the temple at Nippur, *Ur-Ninib*, *Bur-Sin I*, and *Ishme-Dagân*.[2] Specimens of brick legends of the latter will be given in the second half of this volume. The fragment of a stone published on Pl. 9, No. 17, is unfortunately so small that we learn nothing new from it.

More important are the inscriptions of both the other rulers, Pl. 10 and 11. They are taken from bricks which, at the time of their excavation, were out of their original place. These formed rather part of a platform of the Ziqqurratu constructed or restored by Mili-Shikhu, who took them from the ruined walls of his predecessors, as old but still serviceable material for his own work. Various bricks of Ur-Ninib have thus been preserved, all with the same inscribed (not stamped) legend. Of Bur-Sin, on the other hand, only a single brick, broken in two pieces, has as yet been found.

Ur-Ninib, "Man (servant) of God Ninib," is the king hitherto wrongly transcribed as Gamil-Ninib.[3] His inscription, here published, is identical with IV R.[2] 35, No. 5. The fragment of a brick from Nippur, I R. 5, No. XXIV, erroneously ascribed to Ishme-Dagân, is obviously the lower half of the same legend. In addition to the complete name of the ruler, the new text offers the correct reading of l. 4, *na-gid*,[4] *i. e.*, *nâḳidu*, Hebr. נֹקֵד, "shepherd" (of Ur), and of l. 6, *mí-shú-íl*, "he who delivers the commands" (of Eridu).

Bur-Sin I, so designated by me to distinguish him from another king of the same name,[5] Bur-Sin II of the second dynasty of Ur,[6] is a new king of the dynasty of Isin. The phraseology of his inscription is very similar to that of Ur-Ninib and Libit-Anunit[7] (I R. 5, No. XVIII), and thereby assures the correct reading of several characters of the latter inscription. The first sign of l. 4 is not *da* (Winckler) but *íngar*[8] (identical with Brünnow, *l. c.* 1024), and the second sign in l. 8 is probably

[1] Not *Nisin*, as has been generally read—last by Delitzsch, *Geschichte Babyloniens und Assyriens*, p. 79. Cf. the hymn 80, 7–19, 126, l. 3, 4, published by Bezold in *Z. A.* IV, p. 430.

[2] Pl. 9, No. 17, has been placed before Plates 10 and 11 only to save space. Ishme-Dagân was the last king of the dynasty of Isin.

[3] Cf. Hilprecht in *Z. A.* VII, p. 315, note 1.

[4] For this Semitic loan word of the Sumerian language, found also in the inscriptions of Gudea (F. col. IV, 12), cf. Jensen-Zimmern in *Z. A.* III, 200, 208 *seq.* Cf. also Jensen in *K. B.* III, Part 1, p. 4.

[5] Although always written with the other sign *Bur* (Brünnow, *l. c.*, 9068).

[6] Cf. Plates 12, 13, and Vol. I, Part 2.

[7] According to Winckler in Schrader's *K. B.* III, Part 1, p. 86, *Libit-Ishtar.*

[8] Cf. Jensen-Zimmern, *Z. A.* III, p. 199 *seq.*

mí, not *ash.* L. 3–7 in the inscription of Bur-Sin I are of special interest. They read: 3. *íngar lig*(?)[1]*-ga* 4. *Urum*^{ki}*-ma* 5. *gish-kin Urudug*^{ki}*-ga ki-bi-gi* 6. *ín mí-a-tum-ma*[2] 7. *Urug*^{ki}*-ga*, "the powerful shepherd[3] of Ur, the restorer of the oracle tree[4] of Eridu, the lord who delivers the commands of Erech."

GANDE AND THE CASSITE DYNASTY.

A number of inscribed objects excavated in Nippur bear the name of a king[5] who has been transliterated *Gar-de* (?) by Pinches.[6] As I remarked in another place,[7] this transliteration is incorrect. For the first character of the group on Pl. 14, No. 23, l. 2 b, is not the Old Babylonian sign for GAR,[8] but GAN.[9] The second character may be read either *de* or *ne*, the whole name therefore, either *Gande* or *Ganne.* The former reading is the more probable, because the second character, outside of the purely Sumerian[10] texts, is more frequently found with the syllabic value *de* than *ne.*[11]

The contents of the three inscriptions of Gande published on Pl. 14 are identical. They read: 1. ^{Dingir}*En-lil-la* 2. *lugal ki-aga-ni Gan-de* 3. *a-mu-na-shub*, "To

[1] Cf. Jensen, *Z. A.* I, p. 396, note 4.

[2] *mí-a-tum-ma*, corresponding to *mí-shú-íl* (Ur-Ninib, l. 6), as *tum*, like *íl*, is explained by *abâlu*, "to bring, to deliver." Cf. *IV R.*^{2} 35, No. 6, 12, 13.

[3] Cf. *ik-ka-ri Ba-bi-i-lu* "(Nebuchadrezzar II), shepherd of Babylon" (Abel-Winckler, *Keilschrifttexte*, p. 33, l. 19). *Íngar* = *ikkaru*, Hebrew אִכָּר, is a Semitic word adopted by the Sumerian language (Zimmern, *Babylonische Busspsalmen*, p. 5, note 1), and means "farmer," *Landmann* (Jensen-Zimmern, in *Z. A.* III, p. 199 *seq.*; Delitzsch, *Assyrisches Wörterbuch*, pp. 400–402). In view of the principal occupations of the farmer—tilling of the ground and stock-raising—the word occurs as a synonym either of *irrishu*, talm. אריסא (*Z. A.* III, p. 200), or of *nâḳidu*, *rîd alpi* (*Z. A.*, ibid.). Accordingly, it is to be translated either as "farmer" or as "shepherd." The latter meaning is the only possible one in the above-given passage, as the context and a comparison with Ur-Ninib, l. 4—*na-gid Urum*^{ki}*-ma*, "shepherd of Ur'—clearly show. The same meaning is also to be preferred to *Landmann* (Jensen, in Schrader's *K. B.* III, Part 1, p. 59) in passages like Gudea F, col. III, l. 14, where *íngar* stands parallel with *utul*, *sib* and *nagid*, all words for "shepherd."

[4] Cf. Jensen, *Kosmologie*, pp. 99 *seq.*, 249, note.

[5] That the bearer of this name was a king is certain (against Pinches), notwithstanding the omission of the title. Cf. Hilprecht, "Die Ergänzung der Namen zweier Kassitenkönige," *Z. A.* VIII (in print).

[6] *The Academy*, 1891, September 5, p. 199, *a*, *b*.

[7] *Z. A.* VII, p. 315, note 1.

[8] Amiaud et Méchineau, *l. c.*, No. 105.

[9] Ibidem, No. 79, sign 5.

[10] To be understood in the sense established by Lehmann, *Shamashshumukîn*, pp. 62–108.

[11] For this and other reasons I reject the reading *Agane* instead of Agade (= *Akkad!* in spite of Lehmann, *Shamashshumukîn*, p. 73). Cf. also Hommel, *Gesch.*, p. 302.

Bêl, his beloved lord, Gande has presented it." But who was this Gande who left his name on a number of marble vases,[1] on a large unhewn block of white marble, on two others of reddish granite and on the edge of two door sockets belonging to former Babylonian kings? A due consideration of the following points will enable us to answer the question.

1. The short inscription of Gande just translated is written not only on his own monuments by this king, but is also found on the rough edges of a door socket of Sargon I, and another of Bur-Sin II. Hence it follows, that Gande must have lived after their time, *i. e.*, after c. 2400 B. C.

2. On the other hand, it follows from the depth of the place in which the stones were found and also from the peculiar characters of the inscriptions (see below), that Gande could not have ruled after Mili-Shikhu, or, as the immediate seven or eight predecessors of the latter are known, not after c. 1240 B. C.

3. It is remarkable that Gande by two of his inscriptions characterizes door sockets which had previously been presented to the temple as his own gifts. It is in itself clear that these inscriptions cannot be regarded in the sense of inventory labels, as they are sometimes found in connection with Egyptian antiquities. Only one explanation seems possible, namely, that Gande was not a native king, but invaded and conquered Babylonia and regarded the property of the temple in Nippur as his legitimate spoil. As however he, with his victorious hordes, did not leave the subjected country again, but usurped the Babylonian throne, thereby becoming the founder of a new dynasty, the conquered cities and temples became part of his new empire, to which he now restored the trophies of his victory as his own personal gifts. Had he left Babylonia, he certainly would have carried away the treasures of the temple as spoil to his own country, just as Âlusharshid and Narâm-Sin did, after they had conquered Elam and Magan, or Nebuchadrezzar I, after the destruction of Jerusalem.

4. This explanation of Gande is supported by the character of his inscribed objects and by the peculiarity of their cuneiform writing. All his inscriptions are carelessly executed and are engraved very shallowly; indeed, those on the door sockets and large blocks are only scratched in the unhewn stone. Besides, the characters employed violate the laws which underlie the regular development of the Babylonian cuneiform writing. They appear to have been cut by men unaccustomed to use the chisel in writing, who, it is plain, had adopted the Babylonian system of writing, even endeavoring to imitate the characters of a certain period,[2] but who were neither familiar with their original meaning, nor with the

[1] Cf. Vol. I, Part 2.

[2] Cf. *e. g* the characters of the inscriptions of Ur-Nina, de Sarzec, *Découvertes*, Pl. 31, No. 1.

exact form then in use. The scribe regarded *e. g.* GAN (Pl. 14, No. 23) as the doubled form of a certain sign resembling the reversed ancient SAG.[1] For occasionally he divides this character into halves, placing one after the other (Pl. 14, No. 24, 25). The artistic execution of the vases themselves stands in striking contrast to the rude appearance of the inscriptions on them and on the large stones. As a number of uninscribed vases of similar form and of the same skillful workmanship were found together with those of Âlusharshid, there is every reason to believe that Gande's vases formed originally part of the former's gift to the temple, the more so as they were found in close proximity to those of that very ancient king. Only the unhewn blocks of marble and granite, apparently intended for door sockets, were genuine gifts of Gande, probably brought from the Elamite mountains. From the fact that the place occupied by the inscription was not polished or even smoothed, we likewise infer that the scribes of this ruler had neither the artistic taste nor technical training of the Babylonian stonecutters.

5. The name *Gande* has not a Babylonian sound. Besides, it is sometimes found abbreviated into *Gan*. This peculiarity of abbreviating names is characteristic of the rulers of the second and third dynasties of Babylon, as is shown by comparing List b with List a and with the inscriptions of Bibeiashu.[2] Only one king fulfills the requirements (viz., a foreigner, founder of a new dynasty, a prince whose name begins with *Gan*, and who lived between c. 2400 and c. 1240 B. C.). This is Gandash, the first ruler of the Cassite dynasty, which occupied the throne of Babylonia for five hundred and seventy-six years. Gande (otherw. Gan) is abbreviated from Gandash[3] in the same way as Bibe from Bibeiashu.[4]

It is significant that, with the exception of fragment Brit. Mus. 84–2–11, 178 (see note 3), no monument of the founder of the Cassite dynasty and very few of its other members have, up to the present, been found outside of Nippur. This latter was, as I shall later show in detail, the very centre and stronghold of the Cassite dynasty. It is not, therefore, accidental, that the representatives of this foreign house dedicated so many valuable gifts to the temple of Bêl in Nippur. By not paying the same homage to Marduk of Babylon and his illustrious city, which Hammurabi[5] had endeavored to raise to the most prominent position in the political and religious life of the country,

[1] Amiaud et Méchineau, *l. c.*, No. 221.

[2] Cf. above, p. 17.

[3] Who again is identical with the Gaddash of Brit. Mus. 84–2–11, 178 (Winckler, *Unters.*, p. 156, No. 6). Cf. Hilprecht, *Z. A.* VII, p. 309 *seq.*, especially note 4.

[4] Cf. Hilprecht, "Die Ergänzung der Namen zweier Kassitenkönige" in *Z. A.* VIII (in print).

[5] It is worthy of notice, that not one votive object with an inscription of a ruler of the first or second dynasty of Babylon has so far been found in Nippur. These kings concentrated their attention on the glorification of Babylon.

but by restoring the former glory of Ekur, the ancient national sanctuary in Nippur, so deeply rooted in the hearts of the Babylonian people, and by stepping forward as the champions of the sacred rights of "the father of the gods,"[1] they were able to bring about a reconciliation and a final melting together of the Cassite and Semitic elements. Supported by the influential priesthood of Nippur and dreaded as daring warriors by the discontented parties, the Cassites could mould and govern the destinies of Babylonia for nearly six hundred years, until finally they were overwhelmed by new invasions from the East and by the great national uprising in the South, which resulted in placing the native dynasty of Pashe on the throne of Babylon. The essential results to be drawn from the fifty-five votive inscriptions of the Cassite dynasty published on Plates 14–29, I have given in several articles in *Zeitschrift für Assyriologie*[2] and may therefore confine myself to the following points.

The inscriptions on Pl. 8, No. 15, and Pl. 21, No. 43, are written on the obverse and reverse of a tablet in agate. The stone tells its own story. About 2750 B. C., the patesi[3] of a city dedicated the tablet to the goddess Ninna or Ishtar "for the life of Dungi, the powerful champion, king of Ur." Afterwards, possibly about 2285 B. C., at the time of the Elamite invasion, when Kudur-Nankhundi laid hand on the temples of Akkad and carried the image of the goddess Nanâ into Elam, the tablet was also taken away and remained in the possession of the enemies until c. 1300 B. C. Kurigalzu (doubtless the second of the name[4]), after his conquest of Susa, brought it back to Babylonia and presented it to Bêltis of Nippur. For over three thousand years it lay within the walls of Ekur, until again it became the spoil of invaders of Nippur. This time it was carried far away to the modern *mâtu Aḫarri*. Perhaps a later *shar kibrat arba'im* will take it back to the resurrected sanctuary of Nippur. Kurigalzu's inscription on this tablet is of historical importance, because, for the first time, we learn from this king's own inscriptions of his successful campaign against Elam,[4] in the course of which he conquered even Susa.[5] The cuneiform text reads: 1. *Kurigalzu* 2. *shar Karduniash* 3. *êkalla sha ilu Shâsha ki* 4. *sha Elamti ki* 5. *ikshud-ma* 6. *ana ilu Bêlit (NIN-LIL)* 7. *bêltishu* 8. *ana balâṭishu* 9. *iḳîsh*, "Kurigalzu, king of Karduniash, conquered the palace of Susa in Elam and presented (this tablet) to Bêlit, his mistress, for his life."

[1] Inscription of Kadashman-Turgu, Pl. 24, No. 63, l. 1 and 2.

[2] Cf. "Bibliography," II, 9, 11, 12.

[3] This word stood apparently in one of the lost lines at the lower end of the tablet.

[4] Cf. Pinches, "An Early Tablet of the Babylonian Chronicle," in *R. P.*[2], Vol. V, p. 109, col. III, 10–18.

[5] The earliest mention of Susa in the Babylonian cuneiform literature. The absolute proof for the identity of *Shâsha* with *Shûshi* (IV R.[2] 52, 46, *b*; II R. 48, 59, *b*, and Delitzsch, *Paradies*, p. 326), *Shûshan* or *Shushun*, is impossible at present. It seems, however, scarcely possible that *êkallu sha Shâsha sha Elamti* can be anything else than שׁוּשַׁן הַבִּירָה אֲשֶׁר בְּעֵילָם (Dan. viii. 2). The name was probably pronounced *Shôsha(n)*. Cf. also p. 13, note 1 (end).

Another inscription published on the same plate, Nos. 41 and 46, was damaged at the end of each line when the scribe cut it from the block of lapis lazuli,[1] which Kurigalzu dedicated to Bêl. It reads: 1. *A-na* *[ilu]Bêl* (*En*[*-lil*]) 2. *be-el ma-ti-a-ti* be- [*lì-[2]shú*] 3. *Ku-*[*r*]*i-gal-zu ri-ia-um* [*na-ram* *[ilu]Bêlit?*][3] 4. *pa-li-iḫ* [*she-mu-u* *[ilu]Bêl?*],[3] "To Bêl, lord of the lands, his lord, Kurigalzu, the shepherd beloved by Bêlit, he who fears (and) obeys Bêl."

The cuneiform text of the lapis lazuli disc on Pl. 23, No. 61, proves the correctness of my conjecture in *Z. A.* VII, pp. 305–318. The fourth character of l. 3 is, however, not as I supposed, *Ka* but *Kad.*[4] The disc thus furnishes us the new and interesting writing *kaddashman*[5] instead of the hitherto *kadashman.*

No. 66 and 67 of Pl. 25 are the obverse and reverse of the same fragment of an agate ring. The dedication on it was apparently written by one king only, who, in need of space, inscribed both the upper and lower side of his gift. As the remnant of the last character of No. 66 is doubtless to be completed to *Ka-*[*dingir-ra[ki]*], the ideogram *shar*, standing before it, must be the title of a king, whose name ended in *LIL* (the last character of *[dingir]EN-LIL* or Bêl). According to our present knowledge of the rulers of the Cassite dynasty, the name can be read either *Kudur-[dingir]EN-LIL*[6] (cf. No. 64) or *Kadashman-[dingir]EN-LIL* (No. 65). The obverse of the ring (No. 67) contains part of a name ending in [*b*]*u-ri-ia*[*-ash*], which again can be completed either to *Shagashalti-Buriash*, the son of Kudur-*[dingir]EN-LIL*, or[7] to . . . . *buriash* (No. 68, col. I, 5), the son of *Kadashman-[dingir]EN-LIL.* As no inscriptions of the former seem to have been found in Nippur, and the characters of Nos. 66 and 67 resemble those of No. 68 more than of No. 64, I assign the ring to the king mentioned in No. 68, *i. e.*, in all probability Kadashman-Buriash, who, according to III R. 4, No. 1, was at war with an Assyrian king.[8] The following

[1] Cf. Hilprecht, "Zur Lapislazuli Frage im Babylonischen," *Z. A.* VIII (in print).

[2] Brünnow, *l. c.*, 5309. Cf. Meissner, *Beiträge zum Altbabylonischen Privatrecht*, p. 115, No. 21, 3.

[3] Uncertain; restored according to Brit. Mus., 81, 8-30, 9, l. 8,9 (cf. Jensen, Schrader's *K. B.* III, Part 1, p. 120): *ri-'a(sic!* instead of Jensen's *'u)-u na-ram* *[ilu]Bêlit*, *pal-ḫu she-mu-u* *[ilu]-Shamash.*

[4] Brünnow, *l. c.*, 2701. See also my "Nachtrag" in *Z. A.* VII, p. 318.

[5] This is not to be used in favor of Pinches' identification of *kaddash* with *gaddash* and *gan(kan)-dash.* I adhere to what I remarked in *Z. A.* VII, p. 309, note 4, until *Gaddash* or *Gandash*, the founder of the Cassite dynasty, has actually been found written with the character *Ka* (or *Ḳa*), or the word *kad(d)ash* in Cassite proper names like Kad(d)ashman-Turgu, with the value *ga* (or *ḳa*). Cf. Pl. 25, No. 68, col. I, 14, 15, *dumu sag Kad-ash-ma-an-[dingir]EN-LIL*, "(. . . . riash) the first son of Kadashman-EN-LIL." My writing *dumu Ka-dá-ash-ma-an-[dingir] Bêl* (*Z. A.* VII, p. 309, note 3) is to be corrected accordingly.

[6] Generally read *Kudur-Bêl.* It would be more appropriate to transliterate him Kudur-Turgu (see below). That he was king will be shown in my article, "Die Ergänzung der Namen zweier Kassitenkönige," *Z. A.* VIII (in print).

[7] For various obvious reasons other possibilities have been excluded as improbable.

[8] The conjecture of Delitzsch (*Kossäer*, pp. 10 *seq.*; Hommel, *Gesch.*, p. 437 *seq.*), that the Assyrian king was Shalmaneser I, is proved by the new chronology which I am able to establish for a number of Cassite kings. Cf. below p. 37.

is an attempt to restore the legend according to the usual phraseology of this class of inscriptions: Obverse, [^{Dingir}*En-lil lugal-a-ni-(ir) Ka-da-ash-ma-an-B*]*u-ri-ia*-[*ash*], Reverse, [*dumu (sag) Ka-da-ash-ma-an-^{ilu}En*]-*lil lugal Ka*[-*dingir-ra^{ki} a-mu-na-shub*], "To Bêl, his lord, Kadashman-Buriash, (first) son of Kadashman-EN-LIL, king of Babylon, presented it."

The question remains to be settled, whether the name of the father of Kadashman-Buriash is to be read Kadashman-Bêl, as has generally been done,[1] or Kadashman-Enlil[2] or still in another way. The second reading needs no refutation. It is in itself impossible. The first seems to me at present improbable. For while there are Babylonian proper names which are composed of Babylonian words and the name of a foreign god,[3] there is no evidence that there were in use any which contain a Cassite word and at the same time the name of a Babylonian deity. The example quoted by Delitzsch[4] should be read Nazi-Shiḫu.[5] For this very reason I regard the correct pronunciation of Kadashman-^{dingir}*EN-LIL* as being either Kadashman-Kharbe[6] or Kadashman-Turgu,[6] in other words the Cassite king Kadashman-^{dingir}*EN-LIL* may represent either of the two persons. Which of the two is the more probable? There are two Cassites of the name Kadashman-Kharbe to be considered. The one was the father of Kurigalzu I.[7] As, however, there is no proof that he was a king,[8] we leave him here out of consideration, the more readily, as other reasons make his identification with Kadashman-^{dingir}*EN-LIL* well-nigh impossible. The other Kadashman-Kharbe is entirely out of the question,[9] as none of the six kings following the latter successively, according to List b, ends in . . . .

[1] *e. g.*, Delitzsch, *Kossäer*, p. 20; Pinches, *The Academy*, September 5, 1891, p. 199, *b*, and last Hilprecht, *Z. A.* VII, p. 316.

[2] Hommel, *Gesch.*, p. 438: *Kara-Inlil.*

[3] *e. g.*, *Shuḫamuna-aḫ iddina* (Delitzsch, *Kossäer*, pp. 18, 21, 28), *Kashshû-nâdin-aḫu* (ib.).

[4] *Kossäer*, p. 18, note 1.

[5] For Cass. *Shiḫu* = Babyl. *Marduk* cf. Delitzsch, *Kossäer*, pp. 20, 21, 39. From the few published documents in which Nazi-Shiḫu or members of his family (cf. the passages on p. 42) are mentioned, it is evident that this Cassite family lived in Northern Babylonia and was very prominent and influential. Even Nebuchadrezzar I, *shâlilu Kashshî*, treated its chief with distinction (*Freibrief*, col. II, 12: *Kalu Akkad*). In view of the true character (Hilprecht, *Z. A.* p. 311, note 3) of the so-called "Cassito-Semitic vocabulary" (Delitzsch, *Kossäer*, p. 24 *seq.*), and of what has been said about the formation of proper names above, I believe Nazi-Shiḫu in V R. 44, 43*a*, to be the same person as the high dignitary who appears as the first witness in the "Freibrief" of Nebuchadrezzar I.

[6] For Kharbe = Bêl cf. Delitzsch, *Kossäer*, p. 23; for Turgu = Bêl cf. Hilprecht, *Z. A.* VII, p. 316, note 3, and the following lines above.

[7] Cf. Winckler in *Z. A.* II, pp. 307-311

[8] Against Delitzsch, *Gesch.* ("Ubersicht"), who does not hesitate to number him among the Cassite rulers.

[9] The principle stated by Winckler in *Z. A.* II, p. 310, l. 7–10, is correct, but his identification of Kadashman-Bêl with Kadashman-Kharbe is impossible.

riash, as is required.[1] That *Turgu* is another Cassite equivalent for the Babylonian Bêl (of Nippur), I have endeavored to show in *Z. A.* VII, p. 316, note 3. But there are other reasons for identifying Kadashman-Turgu with Kadashman-*dingir* *EN-LIL*: (1) The cuneiform characters of the inscriptions of Kadashman-Turgu on Plates 23, 24, are strikingly similar to those of Kadashman-*dingir* *EN-LIL* and especially his son (Pl. 25). (2) The son of Kadashman-*dingir* *EN-LIL* bears precisely the same title (Pl. 25, No. 68, col. I, 6), as Kadashman-Turgu (Pl. 24, l. 8).[2]

On Pl. 28 we meet with the first personal inscription of *Rammân-shum-uṣur*, contemporary of the Assyrian king, Bêl-kudur-uṣur. The brick legend is written in Sumerian and reads: 1. *Dingir* *En-lil* 2. *lugal kur-kur-ra* 3. *lugal-a-ni-ir* 4. *Dingir* *Rammân-shum-uṣur* 5. *siba she-ga-bi* 6. *ú-a En-lil* *ki*-*a* 7. *sag-ush E-kur-ra* 8. *E-kur e ki-ag-gà-a-ni* 9. *shega* *al-ur-ra-ta* 10. *mu-un-na-ru*, "To Bêl, lord of lands, his lord, Rammân shum-uṣur, his favorite shepherd, adorner of Nippur, chief of Ekur, built Ekur, his beloved house, with bricks."

Winckler, following Sayce,[3] latterly inclines to regard the Babylonian king "Rammân-shum-naṣir," in III R. 4, No. 5, as identical with the ruler whose inscription has just been translated.[4] This, however, is utterly impossible. Sayce and Winckler misread the name of the king mentioned in III R. According to the law underlying the formation of Babylono-Assyrian personal proper names, the cuneiform group *Rammân-MU-SHESH-IR* can only be read *Rammân-mushêshir*, "Rammân is directing (ruling)."[5] This king lived before Burnaburiash and has not even the name in common with the above-given Rammân-shum-uṣur.

[1] For Kadashman-*dingir* *EN-LIL*, himself king (Pl. 25, No. 65), was the father of another king (Pl. 25, No. 68, col. I, 16), ending in . . . . *riash* (ibid., l. 5).

[2] Besides the personal votive inscriptions of King Kadashman-Turgu, many tablets dated in his reign were found in Nippur. It is certain that he was one of the best known princes of the Cassite dynasty and ruled more than fifteen years. It seems, therefore, strange that his name, being entirely Cassite, should have been omitted by the compiler of K. 4426 (V R. 44, 21–44, *a*, *b*). As soon as we read the name in V R. 44, 29, *a*, Kadashman-Turgu, as I proposed above, the difficulty is removed. And, indeed, this reading finds new confirmation. All the names placed together by the compiler in V R. 44, 23–44, are purely Cassite. Therefore we are obliged to regard the ideogram in the name of Kadashman-*dingir* *EN-LIL*, which is explained by its Assyrian equivalent *Tukultî-Bêl* in the right column, as Cassite in the left column. That *dingir* *EN-LIL* was not pronounced Kharbe seems, apart from the above-given reasons, to be indicated by the fact that Kharbe in V R. 44, 33 *a* (*i.e.*, in the left column) is written phonetically *Khar-be*. From names like *Kharbi-Shiḫu* (IV R.[2] 34, No. 2, l. 5, 14), "Bêl (= the lord) is Marduk," we may infer that the real meaning of Kharbi was something like "lord." The use of Kharbi for the name of a certain god, resembles, therefore, closely that of *dingir* *EN* in the later Babylonian time (cf. Tiele, *Gesch.*, p. 538). Turgu on the other hand seems to have been *the* Bêl of the Cassites, *i. e.*, exactly corresponding in his rank to the *dingir* *EN-LIL* or Bêl of Nippur, the highest god of their Pantheon.

[3] *R. P.*[2], Vol. II, p. 207, note 1 (cf. Vol. I, p. 16).

[4] *Gesch.*, p. 102 (cf., however, pp. 88, note, and 157).

[5] Cf. *u-shesh-she-ru*, Sanh. Kuy. 2, 31.

The brick legend on Pl. 29 was already published by Pinches in *Hebraica*, Vol. VI, pp. 55–58. I need make no apology for republishing it here, as Mr. Pinches' edition, I am sorry to say, is of little use, the cuneiform text and translation offered by him being unfortunately incorrect in all essential points. The legend was stamped "by means of a wooden block, on the brick." The stamp, however, having been carved very shallowly, the inscription, "though impressed evenly," is not very distinct on any of the many hundreds of bricks which were found.[1] Besides, the surface is covered "with a thin deposit, which adds to the difficulty of deciphering the inscription." Notwithstanding all this, I did not deem it necessary to mark any of its cuneiform characters as doubtful. My copy was made after a long and careful study of each character, and especial attention was paid to every detail. Certain cuneiform characters could not be recognized distinctly on the original except in the light immediately preceding sunrise, the best time for copying difficult cuneiform inscriptions. On the following points I am obliged to differ from Mr. Pinches:

1. Pinches: "The date of this inscription is uncertain. Judging from the style of the characters, it should be about 1500 B. C., but it may be as early as 2500 B. C." In the present writer's opinion the inscription belongs to one of the last rulers of the Cassite dynasty. For paleographic reasons it cannot be older than 1250 B. C., and in fact belongs to a king who ruled c. 1165 B. C.

2. Pinches transliterates the name of the ruler (l. 4) "Nin-Dubba," regards its bearer to be a lady, and adds, the inscription "is the only text of a queen of Mesopotamia known." Mr. Pinches should have been the more careful in introducing this regent as a female to Assyriologists. I read l. 4 *Mili-Shikhu* (see below) and regard this person as being the well-known Cassite king who ruled c. 1171–1157 B. C.

3. The first character in l. 5 is, according to Mr. Pinches, *nin*, "lady," while in reality the text gives *siba*, "shepherd."

4. Mr. Pinches reads (l. 6) *lugal Ega*, "queen of Ega," and adds, "Ega is probably another name for this city [Nippur], or for a part of it." The phrase thus misunderstood by Mr. Pinches is the very common title *lugal lig* (?)[2] *-ga*, "the powerful king."

The inscription in question reads as follows: 1. ^{Dingir}*En-lil-la(l)* 2. *lugal kur-kur-ra* 3. *lugal-a-ni-ir* 4. ^{Dingir}*Mili-*^{dingir}*Shihu* 5. *siba she-ga-bi* 6. *lugal lig* (?) *-ga* 7. *lugal ub-da tab-tab-ba* 8. *E-kur* 9. *e-ki-ag-gà-a-ni* 10. ^{shega}*al-ur-ra-ta* 11. *mu-un-na-ru*, "To Bêl, lord of lands, his lord, Mili-Shikhu, his favorite shepherd, powerful king, king of the four quarters of the earth, built Ekur, his beloved house, with bricks."

[1] Cf. "Table of Contents."

[2] Jensen in *Z. A.* I, p. 396, note 4.

My reasons for identifying the name in l. 4 with that of Mili-Shikhu are as follows: (1) The king must have lived after Rammân-shum-uṣur, because a few bricks of the latter[1] were found in the platform of the temple erected by him.[2] (2) Paleographic reasons point to the end of the Cassite dynasty as the date of his inscription. Apart from a certain difference of appearance between Rammân-shum-uṣur's legend and that of the king in question, the one having been inscribed, the other stamped, there is a decided similarity between the characters of the two inscriptions. (3) One of the titles (l. 5), the phraseology of the beginning (l. 1–3), and—what is especially characteristic—that of the end of the two inscriptions (l. 8–11, otherw. 10), in other words, 8 (otherw. 7) lines are absolutely identical. Hence it follows that the king in question must have ruled not long after Rammân-shum-uṣur; was possibly his successor. (4) This result is corroborated by an analysis of the first half of l. 4. The determinative *dingir* is not unfrequently found before the names of Cassite kings.[3] The second and third characters are to be read *SHA* (*libbu*)[4] + *ba*. The absence of the two inner wedges in *SHA* is due to the shallowness with which the characters of the stamp were carved. They are found on another (badly preserved) brick, of the same king, the legend of which was written with the hand, and differs slightly in other respects.[5] As the inscription is written in Sumerian, the syllable *ba* indicates that the Sumerian value of the preceding sign ended in *b*, in other words, was the dialectic form of a word ending in *g*—probably *shag*. As the personal proper names occurring in the later Sumerian inscriptions are, as a rule, not to be read Sumerian, but as they were actually pronounced,[6] we read the ideogram (*shaba*) with one of its common Semitic equivalents, *kirbu*, *libbu*, *mîlu*, etc.[7]

Only one of the Semitic ideographic values of this character fulfills the requirement of forming the beginning of one of the well-known names of the last four Cassite kings, *i. e.*, *mîlu* or *mîli*. As, on the other hand, there is only one Cassite king of that period who begins with *Mili*, I confidently believe the last group of cuneiform characters in l. 4 to be an ideogram for the god Marduk, or his Cassite equivalent Shikhu, and read the whole name accordingly *Mili-Shikhu*.

The following list is an attempt at restoring part of the broken List b, and giving the chronology and succession of the last twenty-four kings of the Cassite

[1] Together with a few of Ur-Ninib, Kurigalzu, and one of Bur-Sin I.

[2] Cf. above, p. 27, and "Table of Contents," Pl. 29, No. 82.

[3] Cf. Hilprecht in *Z. A.* VII, pp. 308–310.

[4] Cf. Brünnow, *l. c.*, 7983.

[5] Cf. Vol. I, Part 2.

[6] Cf. also Jensen in Schrader's *K. B.* III, Part 1, p. 117, notes 6–9.

[7] Cf. Brünnow, *l. c.*, 7985–7992.

dynasty, which ruled over Babylonia for 576 years.[1] My reasons for changing the generally accepted order of several of these kings will be found in a special article. If the date which I assigned to the first rulers of the Pashe dynasty be accepted, my chronology from Kurigalzu II to Bêl-shum-iddina II must be regarded as absolutely certain. As the rulers between Barnaburiash and Kurigalzu II are well known, it is also settled beyond doubt that Shagashalti-Buriash lived before Kurigalzu I. Nabuna'id's statements concerning the chronology of Sargon I, Hammurabi, Burna-Buriash, and Shagashalti-Buriash must be regarded as only approximate dates. The events recorded may have occurred at any time in the century before or after the year given.[2] Sennacherib's statement concerning Tukulti-Ninib's cylinder (600 years) is likewise to be understood in a broad sense.

13. Rammân-mushêshir[3]. . . . . . . c. 1442–1423 (about twenty years).
14. Kallima(?)-Sin . . . . c. 1422–1408 (about fifteen years).
15. Kudur-Turgu[4] . . . . c. 1407–1393 (about fifteen years?).
16. Shagashalti-Buriash (his son) . c. 1392–1373 (about twenty years).
17. Kurigalzu I (son of Kadashman-Kharbe) . . . . c. 1372–1348 (about twenty-five years).
18. Kara-indash (his older son?)[5] . c. 1347–1343 (about five years?).
19. Burna-Buriash (son of 17) . . c. 1342–1318 (about twenty-five years).
20. Kara-Khardash (son of 18) . . c. 1317–1308 (about ten years).
21. Nazi-bugash (usurper)[6]. . . . . c. 1307 (about one year).
22. Kurigalzu II (son of 19) . . . . 1306–1284 (nearly twenty-three years).
23. Nazi-Maruttash (his son) . . . 1284–1258 (twenty-six years).
24. Kadashman-Turgu (his son)[7]. . 1257–1241 (seventeen years).
25. Kadashman-Buriash (his son) . 1240–1239 (two years).
26. Is-am-me . . . . ti . . . . 1238–1233 (six years).
27. Shagashalti-Shuriash[8] . . . . . . 1232–1220 (thirteen years).

[1] I regard Peiser's doubts as to the correctness of the 576 years (*Z. A.* VI, p. 267 *seq.*) as unnecessary. Through the excavations at Nippur we are enabled to substantiate part of the statements given as to this dynasty in the list. This fact teaches us *Festina lente!*

[2] And in a sentence like "who built 700 years before Burnaburiash," we have to make even a greater allowance, as we do not know which approximate date Nabuna'id had in mind in connection with the reign of Burnaburiash.

[3] He may have lived at an earlier date.

[4] Generally read Kudur-Bêl. Cf. above, p. 32 *seq.*

[5] The same as Kar-indash, son-in-law of Ashur-uballiṭ, king of Assyria. Cf. *R. P.*², Vol. V, p. 107, l. 5, 6, 12.

[6] Called Su-zigash in *R. P.*², Vol. V, p. 107, l. 10, 13.

[7] Cf. Hilprecht in *Z. A.* VII, p. 317 (cf. Pl. 23, No. 61). The date there assigned to Kadashman-Turgu (c. 1340 B. C.) is to be corrected according to that given above. For his identification with Kadashman-*dingir*EN-LIL see above, p. 33 *seq.*

[8] Cf. above, p. 11.

28. Bibe[iashu] (his son)[1]	1219–1211 (nine years).
29. Bêl-shum-iddina I	1210–1209 (one year and a half).
30. Kadashman-Kharbe	1209–1208 (one year and a half).
31. Rammân-shum-iddina	1207–1202 (six years).
32. Rammân-shum-uṣur	1201–1172 (thirty years).
33. Mili-Shikhu (his son)[2]	1171–1157 (fifteen years).
34. Marduk-abal-iddina (his son) .	1156–1144 (thirteen years).
35. Zamama-shum-iddina	1143 (one year).
36. Bêl-shum-iddina II[3]	1142–1140 (three years).

The last 24 kings = c. 303 years; the first 4 kings = 68 years; the remaining 8 kings = 205 years and 9 months (each 25–26 years in average[4]). Total, 36 kings = 576 years and nine months.

THE DYNASTY OF PASHE.[5]

The cuneiform tablet published on Pl. 30 and 31 forms a part of the collection *J. S.*, purchased by the Expedition from Joseph Shemtob[6] for the University of Pennsylvania, July 21, 1888. Unfortunately it is impossible to ascertain with certainty where the stone tablet was found.[7] In regard to its size and mineralogical character it closely resembles the "black stone of Za'aleh," to be found in I R. 66, with which it also has much in common as to its contents. Both belong to the class of the so-called *kudurru* inscriptions.[8] A piece of ground situated in the land of Kaldi, in the province of Bît-Sinmâgir (I, 1, 2), which for many years (I, 3-8) had been in possession of the family of a certain Nabû-shum-iddina (I, 15) but had been unlawfully reduced in size by Ekarra-ikîsha, at that time governor of Bît-Sinmâgir (I, 9-15), was upon the complaint of the owner (I, 16-II, 5) restored to its original extent by

[1] Identical with S. 2106, l. 9. See above, p. 11.

[2] Cf. Belser in *B. A.* II, p. 197, l. 31.

[3] Cf. *R. P.*[2], Vol. V, p. 111, l. 14; p. 112, l. 16. Cf. also below, p. 41.

[4] Such long reigns appear in no way improbable when compared with the longer reigns of fifteen rulers of the first and second dynasties of Babylon.

[5] Sayce (*R. P.*[2], Vol. I, p. 17, note 3) regards this city as identical with Isin and Patesi. Cf. II R. 53, 13a.

[6] Cf. Harper, *Hebraica* V, pp. 74–76.

[7] Cf. "Table of Contents," Pl. 30, 31.

[8] I reckon as such not only "those Babylonian documents which are inscribed on blocks of stone not always quite regularly hewn" (Belser, *B. A.* II, p. 111), but also those which, like ours and the Za'aleh stone, were kept within doors and possibly as duplicates of the "stèles," which were naturally exposed to destructive influences, so that in disputes concerning boundaries they might furnish the basis for a legal decision.

Bêl-nâdin-aplu, king of Babylon, in the fourth year of his reign (II, 6–10). The document closes with a blessing for the official who in time to come shall respect the decision (II, 11–20), and with a curse against him who shall remove the boundary again (II, 21–24).

Apart from the fact that the stone furnishes us with the name of one of the early kings of the "Sea-land," with that of a hitherto unknown province or county of the land of Kaldi,[1] and with other details of interest, it is of the greatest importance for its chronological bearings. For the following reasons, the stone must be assigned to the Pashe dynasty: (1) The cuneiform characters are those which are characteristic of the documents of that period, and especially they resemble those of the charter (*Freibrief*) of Nebuchadrezzar I.[2] (2) Ekarra-iḳîsha, son of Ea-iddina, is mentioned as an official[3] both on our stone (I, 10, 11; II, 6) and on that of Za'aleh (II, 6). From this it follows that our stone belongs to about the same time as the other which bears the date of the first year of King Marduknâdinaḫê. (3) But we are able to fix the date of our stone even more exactly from the statement in col. I, 7–15, according to which the piece of land in question was in possession of the family of Nabû-shum-iddina until the time of Nebuchadrezzar I, but in the fourth year of King Bêlnâdinaplu was unlawfully encroached upon by the governor, Ekarra-iḳîsha. The result naturally is that the stone dates from the reign of Bêlnâdinaplu, and that the latter was the immediate successor of Nebuchadrezzar I. This proves, at the same time, that the supposition made by Winckler[4] and Delitzsch,[5] that Marduknâdinaḫê was the immediate successor of Nebuchadrezzar I, is wrong, and that the order is rather Nebuchadrezzar I, Bêlnâdinaplu, Marduknâdinaḫê.

The question arises, What place must be assigned to this group of three kings in the dynasty of Pashe? This, in my opinion, can be answered with entire certainty. For although the Babylonian list[6] has been broken off at the very place where the names of the rulers of this dynasty once stood, yet the characters which remain of the last three kings serve us in solving the question. Of the five known kings of this dynasty, 1. Nebuchadrezzar I, 2. Bêlnâdinaplu, 3. Marduknâdinaḫê, 4. Mardukshâpikzîrim (*sic!*) (not Marduktâbikzîrim)[7] 5. Rammânapluiddina, none of them fit into the

[1] Delitzsch, *Paradies*, p. 202 *seq.;* Winckler, *Unters.*, p. 51 *seq.*

[2] Cf. Hilprecht, *Freibrief Nebukadnezar's I*, and V R. 55–57.

[3] On our stone he appears as "governor of Bît-Sinmâgir;" on that of Za'aleh as "governor of the city of Ishin;" so that he probably had been transferred on the accession of Marduk-nâdin-aḫê, or possibly a little earlier. The previous "governor of Ishin" was Shamash-nâdin-shumu, son of Atta-ilûma (cf. *Freibrief Nebukadnezar's I*, col. ii, 17).

[4] *Gesch.*, p. 96. [5] *Gesch.*, p. 93.

[6] Winckler, *Unters.*, p. 146 *seq.*

[7] A cylinder fragment of this king, in possession of Mr. Talcott Williams, of Philadelphia, was transliterated and translated in *Z. A.* IV, 301–323. Paleographic reasons are decisive in fixing the date of this cylinder. Mr. Williams has given me his kind permission to publish the cuneiform text in the second part of the present volume. Cf. below, p. 44.

remaining characters of the last three names of the dynasty. It follows, therefore, that all the five must have reigned before these. As the kings which have been numbered 4 and 5 are known to have been successors of Marduknâdinaḫê, it likewise follows that Nebuchadrezzar I cannot have stood lower than the fourth place in the list. It may be safely asserted, however, that he stood in the first place, and was, therefore, the founder of the Pashe dynasty. To this two objections may be offered: (1) That the traces of the cuneiform characters which follow the number of the years in the List b do not favor the reading of *Nabû;* (2) that Sayce,[1] on the evidence furnished by the "Early Tablet of the Babylonian Chronicle,"[2] col. IV, 17, claims that place in the list for a king *Rammânu-sharra* [or *shum*][3] *-iddina.* In reply to this the following is to be said:

1. Scholars have adhered too closely to the view that the mutilated beginning of the first line of the List b contains after *ilu* traces of the sign SHU,[4] the ideogram for the god Marduk. Winckler, in his edition of the list, cuts loose from this assumption, and gives as certain only *ilu.* This variation from the carefully guarded tradition is supported by Bezold's remark[5] that "at this point the tablet is in a most lamentable condition." The latter, however, seems to recognize traces of two other wedges immediately following. But the chief problem is whether beneath the two horizontal wedges of *ilu,* there can be seen a small horizontal wedge so that the sign can be completed to the combination of *ilu* and AG,[6] the ideogram for *Nabû.* From the fact that all those who have examined the list personally are silent on this point I infer that the tablet at this place is too indistinct to permit any definite conclusion. Then, however, there is nothing in the remaining traces that forbids the reading of *Nabû* instead of Marduk.

2. From what we know from the scanty cuneiform accounts,[7] it is clear that the last years of the Cassite dynasty were a time of war and political disturbance, and that it was the weakness of its last representative which furnished the opportunity for its own overthrow and for the rise of the house of Pashe. No matter what verb may have stood in the effaced passage *R. P.*², Vol. V, p. 112, l. 16,[8] the supposition

[1] *R. P.*², Vol. V, p. 112, note 1.

[2] *R. P.*², Vol. V, pp. 106–114.

[3] The reading of the middle character seems to be doubtful. Mr. Pinches would render a great service to Assyriologists by publishing the exact cuneiform text at an early date.

[4] Brünnow, *l. c.*, 10834.

[5] *Z. A.* IV, p. 317, note 1.

[6] Brünnow, *l. c.*, 2786. Cf. Hommel, *Gesch.*, p. 448.

[7] Cf. especially *R. P.*², Vol. V, pp. 111, 112, l. 14–22.

[8] I favor *umashshir,* "he left," instead of "he renounced" or "abdicated" (Pinches). Cf. however, Tiele, *l. c.*, p. 165.

of Sayce, that line 17 contains the name of the second king of the Pashe dynasty, seems to me improbable, since the same Elamite king, *Kidin-Khutrutash*,[1] who already had attacked Akkad in the time of Bêlshumiddina, is again the assailant in this passage. If Sayce were right, this Elamite would have made his second incursion into Akkad about twenty years after the first. This in itself is possible, but it is made less probable by the expression "Rammânu-shum-iddina returned," which apparently connects this section closely to that which precedes. Besides it will be noticed that Rammânu-shum-iddina does not bear the title of king, as Bêlshumiddina. It seems more probable, therefore, to see in Rammânu-shum-iddina, the unfortunate son (or possibly another relative) of Bêlshumiddina, who "returned" from the place to which Bêlshumiddina or his family had fled, in order to take possession of the throne as his lawful inheritance.

This leads me to the discussion of the reasons for regarding Nebuchadrezzar I as the founder of the Pashe dynasty.

1. It needs no proof that at a time when a country is harried by a powerful enemy,[2] and a descendant of illustrious ancestors puts forward claims to the crown, which are based on historic rights, a usurper who is to found a new dynasty must distinguish himself by eminent courage and ability. Such an able ruler, who, according to our present knowledge, surpassed in preëminence all the other kings of his dynasty, Nebuchadrezzar I is certified to have been. He conducted successfully the wars against Elam, the hereditary enemy of Babylon in the East, turned his arms victoriously against the North by "casting down the mighty Lulubæan," and marched, as no other Babylonian king for centuries had ventured, conquering into Syria.

2. It is worthy of notice that both the documents bearing his name are written in connection with his successful conflict with Elam. His wars with this country, therefore, must have been especially important, perilous and of long duration.[3] Since we have learned from Pinches' recent publication of the Babylonian Chronicle (col. IV, l. 14–22) that the Elamites took advantage of the weakness of the last Cassite king to devastate Northern and Southern Babylonia, the campaigns of Nebuchadrezzar I against Elam become of especial significance. As a usurper he manifestly was able to hold his position only by rendering the Elamites harmless and by defeating them on their own soil, thus "avenging Akkad,"[4] and restoring quiet and peace to his own country.

[1] This and not *Khutru ana* or *Khutrudish* (Pinches, *l. c.*, pp. 111–113) is the probable reading. For the value *tash* of the character in question see Hilprecht in *Z. A.* VII, pp. 309, 310, 314. The name means "subject (servant) of the god Khutrutash" (cf. god Marútash).

[2] R. P.², Vol. V, pp. 111 *seq.*

[3] Winckler, *Gesch.*, p. 96.

[4] Hilprecht, *Freibrief*, col. I, 13.

3. Nebuchadrezzar I bears titles which differ entirely from those at that time characteristic of the rulers of Babylonia. He calls himself, in the manner of the Egyptians, *Shamash mâtishu*, "the Sun of his land;" or *mushammiḫu nîshishu*, "he who makes prosperous his people;" *nâṣir kudûrêti, mukînu ablê*,[1] "he who protects the boundaries, establishes (measured) tracts of land;" *shar kînâti sha dîn mîshari idînu*, "the king of the right, he who judges a righteous judgment;" all are titles which probably refer to the fact that just before the reign of Nebuchadrezzar I there was in Babylonia a time of profound misery, when the land did not enjoy sunshine, and when the peaceful possession of well-defined property was impossible, as the violence of the stronger superseded law and order, while, at the same time, the boundaries of the empire were constantly invaded by powerful enemies; in other words, anarchy as we know it existed in Babylonia at the close of the reign of Bêlshum-iddina. The significant title, *shâlilu Kashshî*, "the conqueror of the Cassites," acquires doubtless, in this connection, the significance of an allusion to the circumstance that it was he who had achieved the restoration of the Semitic element through the overthrow of the Cassite dynasty.[2]

4. The boundary stone IV R.[2], 38, which is dated in the time of Merodachbaladan I, mentions the house (I, 10) and the son (II, 34, 35) of a certain Nazi-Shikhu, while in the "Freibrief" of Nebuchadrezzar I, a certain Nazi-Shikhu is named as a high dignitary, *kalu Akkad*. In view of the rare occurrence of this name in Babylonian literature[3] it is natural to regard the two bearers of the same name as identical. This identification, however, is possible only if Nebuchadrezzar I reigned not long after Merodachbaladan I,[4] *i. e.*, if he, as founder of the Pashe dynasty, came into power some four years after the latter's death.

[1] I formerly transliterated this word *aplê* (as Peiser still does in Schrader's *K. B.* III, Part 1, p. 164). But since 1886 I have changed my view and substituted the above. As the word stands parallel to *kudûrêti*, it must have a similar meaning. In spite of *naḫbalu*, II R. 22, 29, *b. c.*, *ablê* is to be compared with the Hebrew, חֲבָלִי which, in view of the Ethiopic and Arabic *ḥabl* has ḥ. Cf. also Delitzsch, *Wörterbuch*, p. 37, no. 30. In view of the title above quoted it does not seem improbable that Nebuchadrezzar I assumed his highly significant name, "Nebo, protect the boundary," only after his usurpation. Another interpretation of the name, "Nebo, protect (thy) servant," has recently been offered by Jäger (*B. A.* I, 471, note *). But where is the "thy"? The proper names *kudurru* and *kidinnu*, quoted by Jäger, (*l.c.*), are not to be regarded as exclamations but as abbreviations of originally longer names. As the middle part of the name of Nebuchadrezzar is written either *kudurru* or *kudurri* (Bezold, *Babylonisch-Assyrische Literatur*, p. 126), or *kudurra* (Pl. 32, col. II, 7, of the present volume), it cannot mean "my boundary," as I formerly interpreted (*Freibrief*, p. viii, note 1), but "the boundary." Cf. my remarks in *The Sunday School Times*, February 20, 1892, p. 115, note 3.

[2] Cf. Hommel, *Gesch.*, p. 451.

[3] Cf. col. VI, 18 of the boundary stone (published by Belser in *B. A.* II, pp. 171–185), which furnishes us data from the time of the kings *Ninib-kudûri-uṣur* and *Nabû-mukîn-aplu*. For my transliteration and the formation of the name, cf. above, p. 33 and note 5.

[4] For as the son of Nazi-Shikhu who appears as a witness under Merodachbaladan I, was already in possession of the important office of a *sukallu*, his father must have been advanced in years.

5. The second king of the Pashe dynasty, according to List b, reigned only six years. And indeed, while the titles and conquests of Nebuchadrezzar I in his "Freibrief" imply a comparatively long reign, there are indications that his immediate successor, Bêlnâdinaplu, ruled but a short time. This does not necessarily follow from the circumstance that the document on Plates 30 and 31 is dated in the fourth year of his reign; but from the fact that Ṭâb-ashâp-Marduk,[1] son of Esagilzêr,[2] already mentioned under Nebuchadrezzar I as governor of Ḫalwân, appears again as *sukallu* in the first year of Marduk-nâdin-aḫê, *i. e.*, about twenty years later; for it is very unlikely that the same person occupied a high and responsible position under three successive kings, if both of the former two had reigned a long period.

6. Finally this assumption enables us in the simplest way to dispose of certain chronological difficulties, upon which I cannot enter into details here (cf. *e. g. Z. A.* III, p. 269).

The statement of Sennacherib[3] furnishes us with a definite datum for the chronology of the Pashe dynasty. As it seems most natural to connect the carrying off of the images of the gods of Ekallâti, with Marduknâdinaḫê's victory over Assyria, in the tenth year of his reign,[4] we obtain 1107 B. C. as the tenth year of that king's rule, and 1116 B. C. as the year of his accession to the throne. In accordance with what has been said above, Nebuchadrezzar I reigned 1139–1123 B. C.,[5] and Bêl-nâdinaplu in 1122–1117 B. C.

A word remains to be said as to the length of the period covered by the Pashe dynasty. That the reading of seventy-two years which have been generally assigned to it is impossible, Peiser has shown beyond question by a very simple calculation.[6] The number of twelve years for the seventh king of this dynasty, assumed by Tiele

[1] The reading *Ṭabu-ri'êu-Maruduk*, "A beneficent king is Marduk," preferred by Tiele (*Gesch.*, p. 161, note 1), instead of that given above (and first proposed by Oppert and Ménaut in *Documents Juridiques*), needs no refutation. *Ṭâb-ashâp-Marduk* is the only possible one and means "Good is the exorcism of Marduk." The *Caillou de Michaux* upon which *Ṭâb-ashâp-Marduk*, apparently not so far advanced in years, likewise appears, belongs to the reign of Nebuchadrezzar I or of Bêlnâdinaplu (cf. Tiele, *l. c.*, p. 161, and Hommel, *Gesch.*, pp. 454, 459).

[2] That *Esagilzêr* is identical with the *Ina-Esagilzêr* of the Za'aleh stone (col. II, 12), was shown in my commentary on the "Freibrief Nebukadnezar's I," in 1882, which at the time was not printed because of a two years' illness. At present the proof of their identity is unnecessary. Cf. *Eulbar-shurḳi-iddina*, III R. 43, col. I, 29, and *Ina-Eulbar-shurḳi-iddina*, V R. 60, col. I, 29. Cf. also Delitzsch, *Kossäer*, p. 15 (cf. however *Gesch.*, "Übersicht"). To a different effect Jeremias in *B. A.* I, pp. 270, 280; and Peiser in Schrader's *K. B.* III, Part 1, p. 177.

[3] *Bavian*, 48–50. "Rammân and Sala, the gods of the city of Ekallâti, which Marduknâdinaḫê, king of Akkad, at the time of Tiglath-Pileser, king of Assyria, carried off and brought to Babylon, I carried out of Babylon 418 years later, and brought them back to Ekallâti, to their place," *i. e.*, in the year B. C. 689, when Sanherib conquered Babylon.

[4] Cf. III, R. 43, col. I, 5, 27, 28.

[5] This calculation confirms strikingly the year 1130 B. C., which I gave as the approximate date of his "Freibrief" in 1883.

[6] *Z. A.* VI, p. 268 *seq.*

(*l. c.*, p. 111) and favored by Delitzsch,[1] finds no support in Winckler's edition and besides does not suffice to solve the chronological difficulty. As according to Peiser (*l. c.*) the passage is much effaced,[2] and as his proposed reading, $60 + 60 + 12 = 132$ years, is the most simple and probable[3] solution of the existing difficulty, I accept it and accordingly construct the following table:

1.	Nebuchadrezzar I, . .	1139–1123 (seventeen years).
2.	Bêl-nâdin-aplu, ...	1122–1117) (six years).
3.	Marduk-nâdin-aḫê, . .	1116–c. 1102 (c. fifteen, at least ten, years).
4.	Marduk-shâpik-zîrim,[4]	c. 1101–1053 (forty-nine years).
5.	Rammân-aplu-iddina,	
6–7.	Two missing kings,	
8.	. . . . , .	1052–1031 (twenty-two years).
9.	Marduk-bêl . . . . . , .	1030–1029 (one year and six months).
10.	Marduk-zêr . . . . . , .	1029–1016 (thirteen years).
11.	Nabû-shum . . . . . , .	1016–1007 (nine years).

Total one hundred and thirty-two years and six months.

"Anhang" to his *Geschichte*.

[2] It is to be regretted that Winckler has not indicated the actual condition of the passage by shading the effaced portions of the characters.

[3] Cf. also Winckler, *Gesch.*, p. 329, note 17. Another possibility (that $60 + 10 + 10 + 2 = 82$ stood originally there) is less probable for various reasons.

[4] This name has been transliterated *Marduk-shapik-zêr-mâti* (Tiele, *Gesch.*, p. 155; Delitzsch, *Gesch.*, "Übersicht") or *Marduk-shapik-kul-lat* (Winckler, *Gesch.*, p. 98). I regard both transliterations as incorrect, and would substitute that given above for the following reasons: (1) The cylinder fragment published by Dr. Jastrow (cf. above, p. 31, note 7) was unfortunately misunderstood by the latter and misread in various passages. Having examined the fragment carefully, I find that the old Babylonian character transliterated *ta* by Jastrow is distinctly the sign *sha* in the form so characteristic for the documents of the Pashê dynasty. The name can only be read *Marduk-shâpik-zi-ri-im.* (2) This correct reading is important in connection with the transliteration of the name of Rammân-aplu-iddina's predecessor. It is in itself improbable that two rulers of a Babylonian dynasty of eleven kings bore names almost (if not wholly) identical. The thought forces itself upon our mind that Marduk-shâpik-zîrim is the same person as the king whose name was heretofore generally read Marduk-shâpik-zêr-mâti. That at least these two names are identical is certain. The last character of the latter name (*MAT*, Brünnow, *l. c.*, 7386) was either erroneously read by the Assyriologists who copied the so-called "synchronistic history," or by the Assyrian compiler who used a Babylonian original, instead of the character *RIM* (Brünnow, *l. c.*, 8867). For it is well known among Assyriologists that the two characters are nearly identical in the later-middle and the latest periods of Babylonian cuneiform writing. In consideration of this fact, and in view of the phonetic writing *zi-ri-im* on the cylinder fragment, I unhesitatingly read the name in question either phonetically *Marduk-shâpik-zir-rim*, or ideographically (plus phonetic complement) *Marduk-shâpik-zîrim(-rim)*. The king, Marduk-tâbik-zîrim, introduced by Dr. Jastrow and accepted by Peiser (Schrader's *K. B.* III, Part 1, p. 162 *seq.*) as an hitherto unknown ruler of the Pashe dynasty thus disappears. As to my other corrections of certain readings offered by Dr. Jastrow in connection with the cylinder in question cf. "Sprechsaal" in one of the next numbers of *Z. A.*

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Table of Contents.

Part I, Plates 1–35 *and I–XV.*

Abbreviations.

c., circa; **C. B. M.,** Catalogue of the Babylonian Museum, University of Pennsylvania; **col.,** column(s); **d.,** diameter; **Dyn.,** Dynasty; **E.,** East; **fragm.,** fragment(ary); **h.,** height; **Inscr.,** Inscription; **l.,** length; **li.,** line(s); **m.,** meter; **N.,** North; **Nippur I, II, III,** etc., refers to the corresponding numbers on Plate XV; **No.,** number; **Nos.,** numbers; **N. P.,** Notebook of Dr. Peters made on the ruins of Nippur during the second year's excavations; **Obv.,** Obverse; **orig.,** original(ly); **p.,** page; **Pho.,** Photograph; **Pl.,** Plate; **Rev.,** Reverse; **S.,** South; **Sq.,** Squeeze; **T.,** Temple of Bêl; **th.,** thick(ness); **W.,** West; **w.,** width; **Z.,** Ziqqurratu; **Z. A.,** Zeitschrift für Assyriologie.

Measurements are given in centimetres. Whenever the object varies in size, the largest measurement is given

I. Autograph Reproductions.

Plate.	Text.	Date.	Description.
5	6	Âl-usharshid.	Fragm. of a vase in reddish numulite limestone, h. 16.5, d. 18 (of hole 4.4). *Nippur* III, same place as Pl. 4, No. 5. Inscr. orig. 11.75 × 7.05, 6 li. C. B. M. 8888. The text has been restored after No. 5. Cf. Pl. IV, 13.
5	7	Âl-usharshid.	Fragm. of a white marble vase, h. 21, d. 16.4 at the base, 11.2 at the centre. *Nippur* III, same place as Pl. 4, No. 5. Inscr. 4.8 × 5.4, 3 li. C. B. M. 8870. Cf. Pl. V, 14.
5	8	Âl-usharshid.	Fragm. of a white marble vase, orig. h. 6, d. 14.5. *Nippur* III, same place as Pl. 4, No. 5. Inscr. (same as Pl. 5, No. 7) 3.2 × 3.8, 3 li. C. B. M. 8839.
5	9	Âl-usharshid.	Fragm. of a white marble vase, orig. h. 13.5, d. 15 (of hole 6.3). *Nippur* III, same place as Pl. 1, No. 1. Mark on the bottom, 2.4 × 2.6. Same inscr. as Pl. 5, No. 7. N. P.
5	10	Âl-usharshid.	Fragm. of a diorite vase, 7.35 × 2.9 × 0.8, orig. d. 22.2. *Nippur* III, same place as Pl. 4, No. 5. Inscr. 3, orig. 11 li. C. B. M. 8842.
6	11	Same Period.	White marble tablet, Obv. flat, Rev. rounded, 11.3 × 7.2 × 2.65. *Nippur*, apparently from the N. W. extremity of V in the neighborhood of Pl. 3, No. 4 (cf. Hilprecht in *Z. A.* IV, pp. 282–284). Inscr. 8 (Obv.) + 7 (Rev.) = 15 li. C. B. M. 8757. Copied by myself on the ruins of Nippur, April 8, 1889.
7	12	Same Period.	Fragm. of a large vase in white marble, 10 × 12.5 × 6.2. Presumably neighborhood of *Babylon*. Inscr. 2 col., 8 li. C. B. M. 1128.
7	13	c. 3000 B.C.	Fragm. of a slab in compact limestone, 12.8 × 7.35 × 5.55. *Nippur* III, inside of the great S.E. temple wall. Inscr. 3 col., 15 li. C. B. M. 8841.
8	14	Ur-Gur.	Basalt tablet, Obv. flat, Rev. rounded, lower left corner wanting, 12.25 × 5.58 × 2.2. Northern Babylonia, probably *Ursag-Kêsh*. Inscr. 8 (Obv.) + 1 (Rev.) = 9 li. C. B. M. 841.
8	15	Dungi.	Agate tablet, bored lengthwise, both sides convex, lower part wanting, 4.4 × 4.3 × 0.8. *Nippur* III, in a chamber on the edge of the canal outside of the great S.E. wall of T. Obv. Inscr. 8 li. C. B. M. 8598. For Rev. see Pl. 21, No. 43.
9	16	Dungi.	Soapstone tablet, Obv. flat, Rev. rounded, 8.6 × 5 × 1.88. Babylonia, probably *Muqayyar*. Inscr. 6 (Obv.) + 2 (Rev.) = 8 li. C. B. M. 842.
9	17	Ishme-Dagân	Fragm. of a slab in diorite, 8.1 × 10.5 × 5.6. *Nippur* III, S. of Z. Inscr. 3 col., 3 + 2 + 2 = 7 li. C. B. M. 3243.
10	18	Ur-Ninib.	Fragm. of a brick of baked clay, brown, 32 (orig.) × 23 (fragm.) × 8.4 (orig.). *Nippur* III, found out of place in a later structure on the S.E. side of Z. (cf. Pl. 29, No. 82; Pl. 13, No. 22; Pl. 20, No. 38). Inscr. (written) 23.3 × 10.65, 13 li. C. B. M. 9021. Cf. IV, R. 35[2], No. 5.
11	19	Bur-Sin I.	Fragm. of a brick of baked clay, brown, 30.5 (fragm.) × 20 (fragm.) × 6.5 (fragm.). *Nippur* III, found out of place, same place as Pl. 10, No. 18. Inscr. (stamped) 22.5 × 10.5, 10 li. C. B. M. 8642.
12	20	Bur-Sin II.	Door socket in diorite, an irregular cube, c. 19 each side. *Nippur* III, in a small shrine outside of the great S.E. wall of T. Inscr. 15.4 × 13.4, 2 col., 11 + 6 = 17 li. C. B. M. 8838.

Plate.	Text.	Date.	Description.
13	21	Bur-Sin II.	Door socket in diorite, 33 × 28 × 23. *Nippur* III, same place as Pl. 11, No. 19. Inscr. around the hole, 23.5 × 5.35, 17 li. Sq. On the bottom at the edge is the same inscr. as Pl. 14, Nos. 23–25 (cf. also Pl. 1, No. 1).
13	22	Bur-Sin II.	Brick of baked clay, light brown, very soft, covered with bitumen, 30 × 30 × 6.5. *Nippur* III, same place as Pl. 11, No. 19. Inscr. (written) 5.97 × 5.3, 2 li. Sq. The inscription is generally repeated three or four times on the same brick (edges and sides).
14	23–25	Gande.	Large unhewn blocks of white marble and reddish granite, varying in d. from 25-60. *Nippur* III, approximately same place as Pl. 1, No. 1. Inscr. 6 × 5.3; 7 × 6.2; 6.5 × 7.7; each 3 li. Sq.
15	26	c. 2250 B.C.	Cream-colored soapstone tablet, Rev. broken off, 4.85 × 4 × 0.8. Presumably neighborhood of *Babylon*. Inscr. 8 li. C. B. M. 103.
15	27	Hammurabi.	Fragm. of an ornamented soapstone stamp in the shape of a vase, h. 13.3, d. 12.2 at the bottom, 8.7 at the centre. Presumably neighborhood of *Babylon*. Inscr. (on the bottom) 8 li. C. B. M. 1126. Cf. Pl. IX, 20.
15	28	Cassite Dyn.	Lapis lazuli disc, d. 1.7. The thickness of this class of inscribed objects found at the same place, if not expressly stated in the following lines, varies from 0.2 to 0.8 cm. *Nippur* III, same place as Pl. 8, No. 15. C. B. M. 8685.
15	29	Cassite Dyn.	Agate cameo, d. 1.55. *Nippur* III, same place as Pl. 8, No. 15. C. B. M. 8687.
15	30	Cassite Dyn.	Lapis lazuli disc, d. 1.6. *Nippur* III, same place as Pl. 8, No. 15. C. B. M. 8721.
15	31	Cassite Dyn.	Agate cameo, bored lengthwise, 1.7 × 1.9. *Nippur* III, same place as Pl. 8, No. 15. C. B. M. 8723.
15	32	Cassite Dyn.	Lapis lazuli tablet, bored lengthwise, 1.65 × 1.8. *Nippur* I, apparently out of place, in a gully on the surface. C. B. M. 8720.
16	33	Burna-Buriash.	White marble mortar; an uninscribed portion is broken from its side, h. 14.4, d. 12.8. Presumably neighborhood of Babylon. Inscr. 31.5 × 11.25, 27 li. C. B. M. 12. Cf. Pl. IX, 21.
17	33	Burna-Buriash.	The same, continued.
18	34	Burna-Buriash.	Ivory knob of a sceptre (or conventionalized form of a phallus), top rounded, base flat, round hole in the centre, h. 3.5, d. 5.9 at the top, 6.2 at the bottom. *Nippur* III, same place as Pl. 8, No. 15. Inscr. 5.8 × 2.42, 5 li. C. B. M. 8730. Cf. Pl. X, 23.
18	35	Kurigalzu.	Tablet in feldspar (mottled dark brown and gray), upper (inscribed) surface convex, lower flat, 3 × 12.2 × 0.9. *Nippur* III, same place as Pl. 8, No. 15. Inscr. 2 li. C. B. M. 8600.
18	36	Kurigalzu.	Irregular block of lapis lazuli, upper part inscribed, 5.1 × 9.25 × 5. *Nippur* III, same place as Pl. 8, No. 15. Inscr. 3.38 × 4.48, 6 li. C. B. M. 8599. Cf. Pl. XI, 25.
19	37	Kurigalzu.	Door socket in white marble with red veins here and there, 46.5 × 43.8 ×22. *Nippur* III, on the N.E. side of T. near the outer wall. Inscr. on both sides of the hole, 11 li. intended, but only 7 li. inscribed, 14.3 × 14.3. Copied by myself on the ruins of Nippur, April 6, 1889.

Plate.	Text.	Date.	Description.
20	38	Kurigalzu.	Fragm. of a brick of baked clay, brown, 32 (orig.) × 17 (fragm.) × 7 (orig.). *Nippur* III, found out of place in a later structure of the inner wall of Z. (cf. Pl. 29, No. 82; Pl. 10, No. 18). Inscr. 13.5 × 6, 9 li, stamped on the edge; the space being too small, a portion of the last character of each line is wanting. C. B. M. 8636.
20	39	Kurigalzu.	Fragm. of an axe in imitation of lapis lazuli, 9 × 6.3 × 2.7. *Nippur* III, same place as Pl. 8, No. 15. Inscr. 7 li. C. B. M. 9462. Cf. Pl. XI, 26.
21	40	Kurigalzu.	Fragm. of an axe in imitation of lapis lazuli, 5 × 6.35 × 1.5. *Nippur* III, same place as Pl. 8, No. 15. Inscr. 4 li. C. B. M. 8661.
21	41	Kurigalzu.	Fragm. of a lapis lazuli tablet, 1.7 × 1.7. *Nippur* III, same place as Pl. 8, No. 15. Inscr. 3 li. C. B. M. 8662. Originally it formed part of No. 46.
21	42	Kurigalzu.	Fragm. of a lapis lazuli tablet, 1.8 × 1.2. *Nippur* III, same place as Pl. 8, No. 15. Inscr. 2 li. C. B. M. 8663.
21	43	Kurigalzu.	Agate tablet. Rev. of Pl. 8, No. 15. Inscr. 9 li.
21	44	Kurigalzu.	Fragm. of a turquoise tablet. Obv. flat, Rev. rounded; hole bored nearly perpendicular to the lines of the Obv.; 3.4 × 3.4 × 0.8. *Nippur* III, same place as Pl. 8, No. 15. Inscr. 4 li. C. B. M. 8664.
21	45	Kurigalzu.	Lapis lazuli tablet, with two holes, 2 × 2.6. *Nippur* III, same place as Pl. 8, No. 15. Inscr. 2 li. C. B. M. 8665.
21	46	Kurigalzu.	Two fragm. of a lapis lazuli tablet, 3.65 × 7.25. *Nippur* III, same place as Pl. 8, No. 15. Inscr. 4 li. In cutting the tablet from the original block of lapis lazuli the last characters of each line were lost. C. B. M. 8666. The copy has been made from an electrotype, on which the space between the two fragments was given too small (cf. No. 41).
22	47	Kurigalzu.	Nine fragm. of a lapis lazuli tablet, 5.1 × 6 × 0.7. *Nippur* III, same place as Pl. 8, No. 15. Inscr. 6 li. C. B. M. 8667.
22	48	Kurigalzu.	Lapis lazuli tablet, hole bored near the top parallel with the lines. 2.8 × 3.45. *Nippur* III, same place as Pl. 8, No. 15. Inscr. 5 li. C. B. M. 8668.
22	49	Kurigalzu.	Lapis lazuli disc, hole bored near the centre parallel with the lines d. 2.5. *Nippur* III, same place as Pl. 8, No. 15. Inscr. 3 li. N. P.
22	50	Kurigalzu.	Fragm. of an agate ring, d. 1, w. 0.9. *Nippur* III, same place as Pl. 8, No. 15. Inscr. 5 li. C. B. M. 8669. The ring originally formed the beginning of a votive cylinder (c. 2.6 cm. long), which was afterwards cut in 3 pieces, each thus forming a ring. For the centre part see Pl. 26, No. 74. The last part has not been found.
22	51	Kurigalzu.	Agate cameo, 3.2 × 2.4. *Nippur* III, same place as Pl. 8, No. 15. Inscr. 4 li. N. P.
22	52	Kurigalzu.	Fragm. of an agate cameo, 1.7 × 1.2. *Nippur* III, same place as Pl. 8, No. 15. Inscr. 2 li. C. B. M. 8670.
22	53	Nazi-Maruttash.	Fragm. of a lapis lazuli disc, d. 2.97. *Nippur* III, same place as Pl. 8, No. 15. Inscr. 6 li. N. P.

Plate.	Text.	Date.	Description.
22	54	Nazi-Maruttash.	Lapis lazuli disc, d. 2.05. *Nippur* III, same place as Pl. 8, No. 15. Inscr. 5 li. N.P.
22	55	Nazi-Maruttash.	Fragm. of an axe in imitation of lapis lazuli, 4.7 × 4.6 × 1.7. *Nippur* III, same place as Pl. 8, No. 15. Inscr. 4 li. C. B. M. 8671.
23	56	Nazi-Maruttash.	Magnesite knob of a sceptre (or conventionalized form of a phallus), top rounded, base flat, round hole in the centre, h. 5.2, d. 6.9. *Nippur* III, same place as Pl. 8, No. 15. Inscr. around the top, badly effaced. C. B. M. 8728. Cf. Pl. X, 24.
23	57	Nazi-Maruttash.	Magnesite knob of a sceptre (or conventionalized form of a phallus), top slightly rounded, base flat, hole in the centre (round above, square below), h. 5.2, d. 6.1. *Nippur* III, same place as Pl. 8, No. 15. Inscr. around the top, badly effaced. C. B. M. 8727. Cf. Pl. X, 22.
23	58	Nazi-Maruttash.	Fragm. of a lapis lazuli disc, d. 4.4. *Nippur* III, same place as Pl. 8, No. 15. Inscr. 5 li. (orig. 8). N. P.
23	59	Kadashman-Turgu.	Fragm. of a lapis lazuli disc, d. 3.7. *Nippur* III, same place as Pl. 8, No. 15. Inscr. 6 li. (orig. 7). N. P.
23	60	Kadashman-Turgu.	Fragm. of a lapis lazuli disc, d. 2.55. *Nippur* III, same place as Pl. 8, No. 15. Inscr. 4 li. (orig. 5). C. B. M. 8722.
23	61	Kadashman-Turgu.	Lapis lazuli disc, d. 3.55, th. 0.35. Place unknown, probably *Nippur*. Inscr. 8 li. Original in the Museum of Harvard University, Cambridge, Mass. Cf. Lyon in *Proceedings of the American Oriental Society*, May, 1889, pp. cxxxiv–cxxxvii, and Hilprecht in *Z. A.* VII, pp. 305–318.
23	62	Kadashman-Turgu.	Lapis lazuli disc, d. 2.7. *Nippur* III, same place as Pl. 8, No. 15. Inscr. 5 li. C. B. M. 8673.
24	63	Kadashman-Turgu.	Irregular block of lapis lazuli, 17.5 × 11 × 9. *Nippur* III in a room in the mounds S. of T. Inscr. 16.4 × 9.5, 20 li. Sq.
25	64	Kudur-EN-LIL.	Lapis lazuli disc, d. 2.5. *Nippur* III, same place as Pl. 8, No. 15. Inscr. 5 li. N. P.
25	65	Kadashman-EN-LIL.	Fragm. of an agate cameo, d. 3.6. *Nippur* III, same place as Pl. 8, No. 15. Inscr. 5 li. C. B. M. 8674.
25	66	[Kadashman]-EN-LIL.	Fragm. of an agate ring, orig. d. 2.7 (of the hole, 0.9), w. 0.96. *Nippur* III, same place as Pl. 8, No. 15. C. B. M. 8675.
25	67	[Kadashman ?]-Buriash.	Fragm. of an agate ring, Rev. of No. 66.
25	68	[Kadashman ?-Bu]riash.	Irregular block of lapis lazuli, convex on the inscribed surface, 13 × 7.35 × 3. *Nippur* III, same place as Pl. 8, No. 15. Inscr. 11.5 × 5.9, 3 col., 63 li. (orig. 69 ?). Sq.
25	69	Shagashalti-Shuriash.	Magnesite knob of a sceptre (or conventionalized form of a phallus), top rounded, base flat, round hole in the centre, h. c. 5, d. 7. *Nippur* III, same place as Pl. 8, No. 15. Inscr. around the top. N. P.
26	70	Bibeiashu.	Magnesite knob of a sceptre (or conventionalized form of a phallus), top rounded, base flat, round hole in the centre, h. 4.6, d. 6.8. *Nippur* III, same place as Pl. 8, No. 15. Inscr. around the top. C. B. M. 8729.

Plate.	Text.	Date.	Description.
26	71	Bibeiashu.	Lapis lazuli tablet, 2.35 × 2.16. *Nippur* III, same place as Pl. 8, No. 15. Inscr. 5 li. C. B. M. 8682.
26	72	[Bibeia-]shu.	Fragm. of an axe in imitation of lapis lazuli, 11 × 6.95 × 1.25. *Nippur* III, same place as Pl. 8, No. 15. Inscr. 3 li. C. B. M. 8680.
26	73	Cassite Dyn.	Agate cameo, d. c. 1.8. *Nippur* III, same place as Pl. 8, No. 15. C. B. M. 8683.
26	74	Kurigalzu.	Fragm. of an agate ring, d. 1, w. 1.1. *Nippur* III, same place as Pl. 8, No. 15. Inscr. 3 li. C. B. M. 8684. The ring originally formed the centre part of a votive cylinder. Cf. Pl. 22, No. 50.
26	75	Cassite Dyn.	Fragm. of an axe in imitation of lapis lazuli, 6 × 2.5 × 1.5. *Nippur* III, same place as Pl. 8, No. 15. Inscr. 6 li. C. B. M. 8681.
26	76	. . . . . . ia-ash.	Fragm. of an axe in imitation of lapis lazuli, 5.26 × 2.1. *Nippur* III, same place as Pl. 8, No. 15. Inscr. 4 li. N. P.
27	77	Cassite Dyn.	Fragment of a vase in soapstone rock, 8.5 × 8.8 (orig. d. at the bottom 13.2). *Nippur* V, c. 3 m. below the surface. Inscr. 7 li. C. B. M. 8690.
27	78	Nazi-Maruttash.	Fragm. of an axe in imitation of lapis lazuli, 6.2 × 6.2 × 1.7. *Nippur* III, same place as Pl. 8, No. 15. Inscr. 9 li. C. B. M. 8685.
27	79	[Bibeia-]shu.	Fragm. of an axe in imitation of lapis lazuli, 2.35 × 2.85 × 1.5. *Nippur* III, same place as Pl. 8, No. 15. Inscr. 4 li. C. B. M. 8686.
27	80	c. 1100 B.C.	Fragm. of a reddish granite (boundary) stone of phallic shape, l. 15.5. *Nippur* III, c. 1.5 m. below the surface on the slope of the T. hill N.W. of Z. Inscr. 2 col., 8 li. Pho. and N. P. Cf. Pl. XII, 32, 33.
28	81	Rammân-shum-usur.	Fragm. of a baked brick, yellowish, very soft, partly covered with bitumen, 22.5 (fragm.) × 18.4 (fragm.) × 6.9 (orig.). *Nippur* III, found out of place in a later structure of the inner wall of Z. (cf. Pl. 29, No. 82; Pl. 10, No. 18; Pl. 13, No. 22; Pl. 20, No. 38). Inscr. written, 15.2 × 8.6, 10 li. C. B. M. 8643.
29	82	Mili-Shikhu.	Brick of baked clay, brown, partly covered with bitumen, 29.6 × 30.2 × 6.7. *Nippur* III, inner wall of Z. Every brick of this structure bears the name of Mili-Shikhu with exactly the same inscription (stamped), except a few which belong to Ur-Ninib (Pl. 10, No. 18), Bur-Sin (Pl. 11, No. 19), Kurigalzu (Pl. 20, No. 38), Rammânshumuṣur (Pl. 28, No. 81). The latter four evidently formed a part of the ancient structure, and were utilized by Mili-Shikhu in his restoration of the platform of Z. Inscr. stamped, 14.8 × 7, 11 li. C. B. M. 8632. Cf. Pinches "An Early Babylonian Inscription from Niffer" in *Hebraica* VI, pp. 55–58.
30	83	Bêl-nâdin-aplu.	Black limestone tablet, 16.75 × 12.1 × 5.1. Presumably neighborhood of *Babylon*. Obv., slightly rounded, 22 li. C. B. M. 13.
31	83	Bêl-nâdin-aplu.	The same, Rev., rounded, 24 li.
32	84	Nabopolassar.	Cylinder of baked clay, cartridge shaped, hollow, small hole at the top, dark brown with grayish spots; when found, half covered with bitumen; h. 15.2, d. of the base 8.85, d. of the hole 2.2. *Babylon*. Inscr. 3 col., 45 + 65 + 59 = 169 li. C. B. M. 9090. Cf. Pl. XIII, No. 34. The variants have been taken from a mutilated cylinder (B) in the British Museum, published by Strassmaier in *Z. A.* IV, pp. 129–136. Apparent mistakes in Strassmaier's edition

Plate.	Text.	Date.	Description.
			are not quoted as variants (cf. also Strassmaier in *Z. A.* IV, pp. 106–113, and Winckler in Schrader's *Keilinschriftliche Bibliothek* III, Part 2, pp. 2–7).
33	84	Nabopolassar.	The same, continued.
34	85	Nebuchadrezzar II.	Fragm. of a baked clay cylinder, barrel shaped, solid, light brown; h. 23.9, d. 8.8 at the top and base, 11.5 at the centre. *Babylon.* Inscr. 4 col., 23 (orig. c. 48) + 32 (orig. c. 56) + 30 (orig. c. 56) + 28 (orig. c. 48) = 113 (orig. c. 208) li. C. B. M. 1785. Cf. Pl. XIV, No. 35. According to information of the Arabs the cylinder was found whole and intentionally broken lengthwise. The other half is supposed to be in existence.
35	85	Nebuchadrezzar II.	The same, columns III, IV.

II. Photograph (half-tone) Reproductions.

I	1	Sargon I.	Door socket in diorite. *Nippur.* Cf. Pl. 1.
II	2	Sargon I.	Brick stamp of baked clay, Rev. *Nippur.* Cf. Pl. 3, No. 3.
II	3	Narâm-Sin.	Brick stamp of baked clay, Obv. *Nippur.* Cf. Pl. 3, No. 4.
III	4–12	Âl-usharshid.	Fragments of vases from which the text on Pl. 4 has been obtained. *Nippur.* Nos. 4, 5: dolomite; Nos. 6, 8, 9, 10: white marble; No. 7: red banded marble of agate structure; Nos. 11, 12: white marble of stalactitic structure. For the restoration of li. 6 fragm. 8860 (white marble) has been consulted.
IV	13	Âl-usharshid.	Fragm. of a vase in reddish numulite limestone. *Nippur.* Cf. Pl. 5, No. 6.
V	14	Âl-usharshid.	Fragm. of a white marble vase with gray and reddish veins here and there. *Nippur.* Cf. Pl. 5, No. 7.
VI	15	Not later than 2400 B.C.	Fragm. of a white marble slab, 26.65 × 15.8 × 7.9. *Abu Habba.* Original in Constantinople. Photograph taken from a cast. Inscr. on both sides and left edge, 391 li. Obv., 9 col., (20 + 25 + 24 + 22 + 22 + 26 + 19 + 23 + 4 =) 185 li.
VII	16	Not later than 2400 B.C.	The same, Rev., 9 col., (19 + 19 + 23 + 25 + 28 + 24 + 25 + 22 + 13 =) 198 li.
VIII	17	Not later than 2400 B.C.	The same, left edge, 1 col., 18 li.
VIII	18, 19	c. 2400 B.C.	Tablets of baked clay, reddish brown with black spots. These tablets have a peculiar shape; they are rounded at both ends and on the left side, but angular and flat on the right side, as if cut off from a larger tablet. *Yokha.* No. 18 : 10.3 × 4.3, th. 1.6 on the left, 2.2 on the right side. C. B. M. 9042. No. 19 : 10.62 × 4.5, th. 1.7 on the left, 2.55 on the right side. C. B. M. 9041.
IX	20	Hammurabi.	Fragm. of an ornamented stamp in the shape of a vase, made of soapstone (composed of a green micaceous and very soft mineral, probably talc). Presumably neighborhood of *Babylon.* Cf. Pl. 15, No. 27.

Plate.	Text.	Date.	Description.
IX	21	Burna-Buriash.	Fragm. of a white marble mortar. Presumably neighborhood of *Babylon*. Cf. Plates 16, 17.
X	23	Burna-Buriash.	Knob of a sceptre (or conventionalized form of a phallus) in ivory. Side view. *Nippur*. Cf. Pl. 18, No. 34.
X	22, 24	Nazi-Maruttash.	Knobs of sceptres (cf. Pl. X, 23) in magnesite. Top views. *Nippur*. Cf. Pl. 23, Nos. 57, 56.
XI	25	Kurigalzu.	Inscribed block of lapis lazuli, tablet in process of cutting. *Nippur*. Cf. Pl. 18, No. 36.
XI	26	Kurigalzu.	Fragm. of a votive battle axe in imitation of lapis lazuli (blue glass). *Nippur*. Cf. Pl. 20, No. 39.
XI	27	c. 1350 B.C.	Fragm. of a votive battle axe in imitation of lapis lazuli, $8.32 \times 5.65 \times 5.1$. *Nippur* III, same place as Pl. 8, No. 15. C. B. M. 8800.
XI	28	c. 1350 B.C.	Fragm. of a votive battle axe in lapis lazuli, $6.4 \times 5.7 \times 1.5$. The inscription has been erased in order to use the material. *Nippur* III, same place as Pl. 8, No. 15. C. B. M. 8597.
XII	29–31	c. 1150 B.C.	Three small fragments of an inscribed bas-relief in a basaltic stone, h. c.5. *Nippur* III, on the S.E. side of the Bur-Sin shrine (cf. Pl. 11, No. 19).
XII	32, 33	c. 1100 B.C.	Fragm. of a reddish granite (boundary) stone of phallic shape. *Nippur*. Two views of the same stone. Cf. Pl. 27, No. 80.
XIII	34	Nabopolassar.	Cylinder of baked clay, cartridge-shaped, hollow, small hole at the top. *Babylon*. Cf. Plates 32, 33.
XIV	35	Nebuchadrezzar II.	Cylinder of baked clay, barrel-shaped, solid. *Babylon*. Cf. Plates 34, 35.
XV	36	1889 A.D.	Plan of the first year's excavations at Nippur (February 5 to April 16).

ARTICLE II.

THE MAMMALIA OF THE DEEP RIVER BEDS.

BY W. B. SCOTT,

COLLEGE OF NEW JERSEY, PRINCETON.

Read before the American Philosophical Society, October 6, 1893.

The ninth Princeton geological expedition to the Tertiary formations of the Far West selected as its field of operations the valley of Smith river, or Deep creek, as it is variously called, in central Montana. The party, which was under the direction of the writer and Prof. W. F. Magie, consisted of the following students: Messrs. Butler, Benet, Coulter, Hosford, Jefferson and Stevenson, and spent a part of the summer of 1891 in exploring the very limited outcrops of lacustrine beds in the region mentioned. We had the good fortune to secure the services of Prof. O. C. Mortson, of Great Falls, Mont., as a guide, and to his minute knowledge of the country and zealous labors the success of the undertaking is in large measure due.

Many gentlemen in Great Falls, White Sulphur Springs and Livingston took great interest in the work of the expedition and rendered every assistance in their power. To enumerate all of those to whom we are under obligations for many kindnesses would be impossible, but special thanks are due to the Hon. Paris Gibson and Mr. W. W. Connor, of Great Falls, but for whose most kind and prompt assistance at a critical period the trip would necessarily have been abandoned.

GEOLOGICAL MUSEUM, PRINCETON, N. J., September 20, 1893.

The literature of the Deep River or "*Ticholeptus*" beds is rather limited, as the region has been comparatively little explored. The formation was first discovered by Grinnell and Dana, in 1875, and their brief account may be quoted almost in full.

"During the explorations carried on last summer under the direction of Col. William Ludlow, Corps of Engineers, a series of Tertiary deposits were identified by the writers near Camp Baker, Montana. These deposits indicate the existence in this region of a Miocene lake basin, which was succeeded by another lake basin in Pliocene time.

"Camp Baker [the spot marked Logan on the map herewith given] is situated on Deep creek, a stream which flows into the Missouri river above Sun river. It lies about fifty miles due east of Helena. It is surrounded on all sides by mountains, of which the Big Belt range, lying immediately to the south or southwest, is the highest and most conspicuous. . . . .

"The Tertiary beds found here consist, for the most part, of homogeneous cream-colored clays, so hard as to be with difficulty cut with a knife. The beds are horizontal and rest unconformably upon the upturned red and yellow slates below. The clays of which they are formed resemble closely those found in the Miocene [*i. e.*, White River] beds at Scott's Bluffs, near the North Platte river, in Wyoming. The deposits at Camp Baker have been extensively denuded and nowhere reach any great thickness. At a point about three miles southeast of the Post, some bluffs were noticed where the Miocene beds attained a thickness of about two hundred feet, and these were capped by fifty feet of the Pliocene clays, both beds containing characteristic fossils. In the underlying Miocene beds were found a species of *Rhinoceros*, several species of *Oreodon* Leidy and *Eporeodon* Marsh, a canine tooth apparently of *Elotherium* Pomel and remains of Turtles. In the Pliocene beds the principal fossils were a species apparently of *Merychyus* Leidy, remains of an equine smaller than the modern horse, and Pliocene Turtles. These fossils have not yet been carefully studied, and for this reason their relations to the remains found in the other lake basins of similar age cannot be stated.

"We saw the first exposures of these beds a few miles west of the Sulphur Springs. . . . . This point is about six miles southeast of Camp Baker. From here, the bed was traced continuously along Deep creek for a distance of fifteen miles, extending quite up to the mountains, on the eastern side at least. Beds of the same character, containing similar fossils, were found on White-Tailed Deer creek, a branch of Deep creek, about seven miles to the north of Camp Baker, as well as on Camas creek, to the southwest of the Post. Traces of this deposit, containing what appear to be remains of *Rhinoceros*, were also found two miles or more south of Moss Agate Springs and at a considerable elevation above the creek bed. With more time than we had at command, they could no doubt have been traced much farther, although in many places the beds have been washed out or have been covered by the later local drift.

"These Tertiary beds were all laid down after the elevation of the mountains and the igneous eruptions. They are, as has been said, perfectly horizontal, and are often seen covering over ridges of trachyte. The line of separation between the Miocene and Pliocene beds is in some places well marked. It consists of about six feet of hard sands, interstratified with layers of very small water-worn pebbles soldered together into a hard mass, but very easily picked out with a knife. Immediately above the strata of pebbles the Pliocene fossils were found. In several places fragments of trachyte were noticed in the Pliocene beds" (No. 18, pp. 126–128).

The next account of this formation was given by Cope, who had sent his assistant, Isaacs, to collect in the valley and described a number of new forms from it. His collection embraced specimens from the upper beds only, those called Pliocene by Grinnell and Dana, and these he referred to the Loup Fork. In 1879 (No. 3), Cope divided the Loup Fork into two horizons, which he called the *Ticholeptus* and *Procamelus* beds respectively, the former being the beds of the Deep River region. Subsequently (Nos. 6, 8, 10), Cope raised the Ticholeptus beds to a rank coördinate with that of the John Day or the Loup Fork, and gives the following list of species as occurring in the Montana area: *Mastodon proavus*, *Protohippus sejunctus*, *Merycochœrus montanus*, *Merychyus zygomaticus*, *M. pariogonus*, *Cyclopidius simus*, *C. emydinus*, *Pithecistes brevifacies*, *P. decedens*, *P. heterodon*, *Procamelus* vel *Protolabis* sp. *Blastomeryx borealis* (No. 8, p. 369). In his latest paper on the subject, this writer defines the formation as follows: "TICHOLEPTUS. *Mammalia.* Presence of Anchitherium, Proboscidea and Camelidæ and the Oreodont genera Merycochœrus, Merychyus, Cyclopidius and Pithecistes. Absence of ? Elotheriidæ, ? Poebrotheriidæ, ? Nimravidæ and Cosoryx. This horizon requires further exploration, as but twenty species have been thus far determined from it. But it is evidently intermediate in age between the John Day and Loup Fork epochs, with greater affinities to the latter. It differs from the latter in the presence of Anchitherium, numerous genera and species of Oreodontidæ, and in the absence of Cosoryx. The formation is known from three regions: first, from western Nebraska; second, from the valley of Deep river, Montana; and third, from Cottonwood creek, Oregon. Its thickness has not yet been stated" (No. 6, pp. 456, 457).

It should be noted that in these lists the name *Anchitherium* is used for the John Day equines, to which, in this paper, I have applied Marsh's name, *Miohippus*, for reasons which will appear later. This point is of importance.

In 1891, I published a brief note upon the subject of this horizon (No. 31). At that time the fossils collected were still in the matrix, and only the hasty examinations in the field were available for the purposes of comparison. Consequently, a number of errors crept into the work, so as to greatly vitiate its conclusions, which will not be further referred to here. In a second note (*American Naturalist*, 1893,

p. 660) I gave preliminary definitions of the new genera and species contained in the collections made by the Princeton party.

Now that this collection has been worked over and can be compared with Prof. Cope's material from the same locality, some definite statements may be made with regard to the geological and palæontological relations of the Deep River beds. So far as the stratigraphy is concerned, there is little to add to the account of Grinnell and Dana, except in one particular. The statements of these authors seem to imply that the two sets of beds are conformable throughout, but there is strong evidence which goes to show that this is not the case. In the first place, there is a marked lithological contrast between the two series, the lower being very hard and the upper, for the most part, incoherent sands, though nodules of harder material have, in many cases, formed around the bones. The general character of the lower beds is very much like that of the older Miocene, the White River or John Day, while the upper are more like the Loup Fork. Though both sets of strata are generally horizontal, with local exceptions, the upper beds appear to rest upon an eroded surface of the underlying strata. Thus, at one point, the older beds, as exposed in a line of buttes—apparently, at least—rise higher than an exposure of the newer strata across the ravine from the first exposure. In the absence of instruments, this point could not be determined quite certainly, but it is very probable. Towards the north and east the upper beds appear to extend beyond the lower and to produce an uncomformity by overlap. Finally, the fossil contents of the two series of strata are very strikingly different, not a single species of mammal and not more than two genera are common to the two, and those genera range from the John Day into the upper Loup Fork. Such radical and sudden changes are hardly to be explained on the hypothesis of migration, and point to a considerable hiatus between the times of deposition of the two sets of strata.

The following species of mammals were found in the lower beds: *Cynodesmus thoöides* Scott, *Steneofiber montanus* Scott, *Cœnopus* sp., *Miohippus annectens?* Marsh, *M. anceps?* Marsh, *M.* (*Anchitherium*) *equiceps?* Cope, *Mesoreodon chelonyx* Scott, *M. intermedius* Scott, *Poebrotherium* sp., *Hypertragulus calcaratus* Cope. This list appears to be a scanty one, but this is explained by the fact that the exposures which yielded well-preserved fossils are very limited in extent, a few acres at most, and when we compare them with the vast regions over which collections from the other Tertiary formations have been gathered, the disproportion will not seem so striking. Indeed, I know of very few spots of equal extent which have yielded so large a number of individuals and species. The facies of this fauna is undeniably that of the John Day Miocene. All of the genera but two, and several of the species, occur in the typical Oregon localities, and while, owing to the very small area of the Montana beds, we cannot lay much stress upon the absence of certain characteristic John Day forms, yet the presence of such relatively modernized genera as *Cynodesmus* and *Mesoreodon* indicates that these beds should be referred to the summit of the John Day formation. This is of interest as being the first identification of this horizon east of the Rocky mountains.

The upper beds, which Grinnell and Dana called Pliocene, present a very different assemblage of species. Cope's collection, so far as I can judge, was gathered entirely from these beds and contains nothing from the lower horizon. His collection and that made by the Princeton party are, as would naturally be expected, not quite coëxtensive, each containing some forms which the other does not. Combining the two, we obtain the following list: *Canis? anceps* Scott, *Chalicotherium?* sp., *Aphelops* sp., *Miohippus* sp., *Anchitherium equinum* Scott, *Desmatippus crenidens* Scott, *Protohippus sejunctus* Cope, *Protohippus* (*Merychippus*) *insignis* Leidy, *Merychyus* (*Ticholeptus*) *zygomaticus* Cope, *M. pariogonus* Cope, *Merycochœrus montanus* Cope, *Cyclopidius simus* Cope, *C. emydinus* Cope, *C. incisivus* Scott, *Pithecistes brevifacies* Cope, *P. decedens* Cope, *P. heterodon* Cope, *Protolabis* sp., *Procamelus* sp., *Blastomeryx borealis* Cope, *B. antelopinus* Scott, *Mastodon proavus* Cope. In addition to this list should be mentioned a considerable number of equine animals, which cannot be well identified, as the specimens are scattered vertebræ, limb and foot bones, not accompanied by teeth, but which, from the variations in size and details of construction, point to several species not enumerated above.

The resemblance of this fauna to that of the Loup Fork has been obvious from the first, for it was doubtless the latter formation to which Grinnell and Dana referred under the name "Pliocene." For the same reason of very limited exposures, as in the case of the lower beds, when compared with the John Day of Oregon, we cannot insist very strongly upon the absence of typical Loup Fork genera from the upper series of Deep River strata. Of much greater significance is the occurrence in the latter of five genera and fourteen species of mammals which have not been found in the vastly more extensive and carefully examined Loup Fork deposits. This fact, having regard to the character of the species involved, points to the conclusion, already drawn by Cope, that these beds are older than the typical Loup Fork horizon, but their faunal connection with that horizon is so close that there seems little ground for considering the Deep River as an "epoch" of coördinate rank with the three other Miocene epochs. The relation between the Deep River and Loup Fork beds is more intimate than that between the Wind River and the Bridger proper of the Eocene. My own preference is, therefore, to refer both series to the Loup Fork, as Cope originally did, and then subdivide that formation into two horizons. The names which Cope first proposed for these subdivisions, the *Ticholeptus* and *Procamelus* beds respectively, are inapplicable, for the former name is a synonym of *Merychyus*, a genus which occurs in both horizons, and, as now appears, *Procamelus* probably does also.

I cannot agree with Cope in regarding the strata of western Nebraska and Cottonwood creek, Oregon, as referable to the same horizon as those of the Deep river valley, in Montana. In the case of the former, the determination rests chiefly upon the presence there of *Leptauchenia*, which Hayden found associated with *Oreodon*, *Ischyromys*, *Hyracodon* and other characteristic White River forms (see Leidy, No. 23, pp. 20, 21). Cope has questioned the correctness of this statement as to *Leptauchenia*, but it has been abundantly confirmed, that genus being an undoubted White River form. Hayden's reference of *Merycochœrus* and *Protomeryx* to this same horizon is almost certainly erroneous and has not been confirmed by subsequent observers. The reference of the beds developed along Cottonwood creek and the upper John Day river, in Oregon, to the Deep River horizon, is determined by the occurrence in them of a so-called *Anchitherium* and of a species identified as *Blastomeryx borealis.* It should be noted, however, that the term *Anchitherium* is used in the sense of *Miohippus*, the species from Montana which I have called *A. equinum* is a very different animal and belongs to the group of *A. aurelianense*, of Europe, which it equals in size. *Miohippus* is found in the typical Loup Fork, as well as in the lower series (see Osborn, No. 28, p. 89, under the title *?Anchitherium parvulum*). No great weight, therefore, can be attached to the occurrence of the genus in the Cottonwood Creek beds. The presence of *Blastomeryx borealis* would, of itself, be insufficient for the correlation of the two localities, but the identification of the species is not at all certain. Besides certain minor differences in the teeth, the limb bones from the Oregon beds indicate the existence there of two species, both of which are much heavier than the Montana forms and more like others from the Loup Fork of Kansas. Cope, himself, was struck by the faunal differences of the two localities. He says: "The only species common to the two lists is the *Blastomeryx borealis*, a fact which indicates some important differences in the two horizons, either epochal or faunal" (No. 8, p. 369).

Present evidence appears, therefore, to point to the conclusion that the upper series of strata developed in the valley of Deep river form a well-marked horizon at the base of the Loup Fork, and that they are not exactly paralleled by any deposits as yet known elsewhere; and, further, that the lower series of the Montana strata should be referred to the summit of the John Day, where they form a less distinctly marked horizon. Together, the two series tend to bridge over the gap between the John Day, on the one hand, and the typical Loup Fork, though they by no means completely close the hiatus. It is a more difficult task to correlate these beds with their European equivalents. The Loup Fork horizon was referred by Leidy and Hayden to the Pliocene, a view which is still maintained by some authorities, but, as Cope has shown, the determination rests upon the supposed occurrence in these beds of forms having a very modern facies, and which were very probably derived from newer overlying strata, since, in typical Loup Fork exposures not covered by these newer beds, the modernized forms have not been found. The recent discovery of the Blanco beds, of Texas, with their true Pliocene fauna (see Cope, No. 11), lends additional force to Cope's contention that the Loup Fork should be referred to the upper Miocene. Branco has objected to this correlation, as follows:

"Eine scharfe Parallelisirung wird hier durch die verschiedene Zusammensetzung der beiderseitigen Faunen erschwert. Auf der einen Seite fehlen der Loup Fork Gruppe echt miocaene Formen wie *Anthracotherium* und *Anchitherium* und es treten dafür Geschlechter von jugendlicherem Aussehen wie *Protohippus* und *Hippidium* auf. Andererseits aber repräsentiren nicht nur die amerikanischen *Oreodontidæ* ungefähr ein mit dem europäischen *Cœnotherium* übereinstimmendes Entwicklungsstadium, sondern beiden Faunen sind auch direct *Steneofiber*, *Amphicyon*, *Tetralophodon*, *Hipparion* und *Procervulus* gemeinsam. Man wird also mit Cope diese Parallelisirung der Loup-Fork-Gruppe mit dem Miocaen Europa's im Allgemeinen gelten lassen müssen, wenn gleich man nicht übersehen darf, dass dieselbe durch Formen wie *Protohippus* und *Hippidium*, welche dem Pferde der Jetztzeit bereits recht nahestehen, sowie durch das Vorkommen von *Dicotyles*, *Hystrix* und *Mustela* einen entschieden jugendlicheren Charakter erhält als die miocaene Fauna Europa's" (No. 2, p. 149).

These objections rest, for the most part, upon the incorrect identifications of European and American genera, which were current at the time Branco's paper was written. As will be seen in the sequel, *Anchitherium* is present in the lower Loup Fork and not in the White River and John Day, the equines of which formations have been erroneously referred to that genus. The absence of *Anthracotherium* from the Loup Fork is of no weight, since the genus is quite unknown in America. The occurrence of *Hystrix*, *Dicotyles* and *Mustela* in the Loup Fork beds is extremely doubtful, the identifications being made on very imperfect specimens. The reference of *Hippidium* to this horizon is also very doubtful and has not been confirmed. If, as is almost certainly the case, the equine series is of American origin, there is nothing surprising in the fact that the series should be, on this continent, one stage in advance of its contemporaries in Europe, just as the American ruminants in several horizons lag behind their contemporaries of the Old World. Further, to regard the Loup Fork as Pliocene involves the assertion that *Procamelus* in America was contemporary with *Camelus* in Asia, which, seeing that the camel series is of American origin, is most improbable.

Of the European faunas, that of Sansan and Simorre offers the best analogy with that of the Deep River beds. In both continents this horizon is marked by the first appearance of the mastodons, and, since the Proboscidea would seem to have originated in neither Europe nor America, but to have reached both regions by migration, this fact is significant. *Anchitherium*, in the restricted sense in which I have used that word, is likewise common to both, and, as this genus has a very restricted range in time, it is a most important fossil. *Blastomeryx* is exceedingly like the Sansan species of *Palæomeryx*, though more primitive in some respects. No stress can be laid upon the supposed *Amphicyon* and *Procervulus* of the Loup Fork, as these names are incorrectly given to the American forms.

If Dall's contention, that North and South America were not united until the close of the Miocene (No. 12, p. 21), be confirmed, the Loup Fork will necessarily be referred to the Pliocene, as is indicated by the occurrence in those beds of the glyptodont genus, *Caryoderma* Cope, a South American type, though the genus itself has not yet been obtained in that continent. But the evidence for the date of the elevation of Central America and the Isthmus of Panama is by no means conclusive. Gabb's statement is to the effect that "The communication between the Atlantic and Pacific in the region of Costa Rica was interrupted in the Pliocene *or subsequent to the deposition of the mass of the Miocene strata*" (italics mine) (quoted in Dall and Harris, No. 12, p. 188, from Gabb's MS. report). This is quite compatible with the view that the connection of the two continents was made before the end of the Miocene. If we may provisionally regard the Deep River beds (upper series) as equivalent to those of Sansan and Steinheim, the John Day would consequently be about equivalent to the lower Miocene of St. Gérand le Puy, though probably somewhat older, and the White River to the beds of Rouzon or the "Marnes lacustres." The term Oligocene has not been found necessary in this country, the line between the Uinta and White River beds being a clear and convenient demarcation between the Eocene and Miocene. Nevertheless, much confusion and incorrect reasoning have resulted from calling the White River simply Miocene. The presence of such genera as *Hyænodon*, *Hemipsalodon*, *Mesonyx*, *Elotherium*, *Hyopotamus*, etc., sufficiently proves these beds to be more ancient than the true Miocene of Europe, and it would be much to the advantage of clearness and consistency if the White River were called Oligocene, a view for which Cope has long contended.

In the descriptive portion of this paper the fossils will be treated according to their systematic position, as the interest attaching to them is especially morphological. The lack of smaller animals in the collections is very noticeable. The lower beds have yielded but one rodent and the upper none at all; only two carnivores, both dogs, have been found. None of the Insectivora or Chiroptera have been detected. The fauna, as so far known, consists, therefore, almost entirely of medium and large-sized ungulates, for which the conditions of fossilization are, no doubt, chiefly responsible.

CARNIVORA.

Canidæ.

CYNODESMUS Scott.

(Pl. I, Figs. 1-5.)

Amer. Naturalist, 1893, p. 660.

Canine animals having the dentition of the microdont forms of *Canis*, but with the skull structure of the ancient genera. Cerebral hemispheres small, not overlapping the olfactory lobes or cerebellum, and with fewer and simpler convolutions than any of the recent *Canidæ*. Postglenoid foramen concealed or absent.

Cynodesmus thoöides Scott.

(*loc. cit.*)

Dentition microdont; deuterocone of upper sectorial relatively well developed; face short, cranium elongate; small frontal sinuses present; mandible non-lobate with stout angular hook and broad, recurved coronoid; size medium.

The technical distinction of this genus from *Cynodictis* is by no means easy, and yet it becomes very clear on an examination of the two; while the latter very probably represents a side branch, leading away from the direct canine phylum, the former may, with equal probability, be regarded as being either in the direct line of canine descent or but little removed from it.

In order to make clear the character of this interesting form, it will be most convenient to compare it carefully with some typical modern species, for which purpose the coyote, *Canis latrans*, will be taken as a standard.

I. Dentition. A. *Upper Jaw.* The incisors are very small and form a nearly straight row, the external pair projecting but little behind the others. The first and second are of nearly equal size, while the third is somewhat larger, though the difference is much less marked than in *C. latrans* or even than in the John Day species, *Temnocyon coryphœus;* the teeth are crowded together, not spaced apart as in the latter species. The diastema between the external incisor and the canine is rather short. The latter is as well developed, relatively, as in the coyote, but of a somewhat different form, being more oval and less compressed in section; the depression on the inner face and its anterior bounding ridge of enamel are also less marked.

Except for their relative shortness (antero-posteriorly) and height, the premolars closely resemble those of the modern species. $\underline{\text{p. 1}}$ is a very small and simple tooth, implanted by a single fang; the crown is of compressed conical shape, without posterior cingulum. $\underline{\text{p. 2}}$ is much larger, though small as compared with the same tooth in *C. latrans;* it is of elongated, compressed, conical form, but has no posterior basal cusp (tritocone) such as occurs in the coyote. $\underline{\text{p. 3}}$ is a still larger tooth of similar construction, except that a small tritocone and posterior cingulum have been added, which, however, are less conspicuous than in *C. latrans.* The sectorial ($\underline{\text{p. 4}}$) differs but little in any respect from that of the existing microdont species of *Canis;* the protocone exceeds the tritocone less in antero-posterior extent than in the coyote, and the deuterocone is much more distinctly developed than in that species, so that the transverse diameter of the crown is greater, not only in proportion to the antero-posterior diameter (length) and to the size of the whole skull, but actually as well. In some recent species of *Canis*, however, the deuterocone is quite as well developed. The premolars are quite closely crowded together and set obliquely to the line of the alveolus, so as to slightly overlap one another; posteriorly, the two lines of premolars diverge quite rapidly, while the molars converge, so that the angulation between the two series is very marked.

The first molar is wider proportionately to its fore and aft length than in *C. latrans*, and the external cusps, para- and metacones are lower, more conical, and less angulate and pyramidal in shape than in the coyote. The cingulum is very strongly developed at the antero-external angle of the crown, so as almost to deserve the name of a parastyle, while it becomes very faintly marked upon the metacone. The inner elements of the crown, the protocone and crescentic cingulum, are not nearly so prominent as in the coyote; the anterior conule is slightly better developed, and the posterior distinctly less so, than in that animal. $\underline{\text{m. 2}}$ is much reduced; the external cingulum is faintly marked, except on the paracone, and the internal one not nearly so strongly developed as in *Canis latrans.*

B. *Lower Jaw.* The incisors are very small and set closely together, and, as is usual in the dogs, the second pair are crowded back out of line with the others; in dimensions, they increase regularly from the first to the third. The median pair are too much worn to show whether they possessed bifid crowns, but this is clearly the case in the second and lateral pair; the posterior groove which indicates this structure is more median in position than in the modern form. The canines are shaped very much as in the latter, but are shorter and diverge less towards their apices.

The first premolar resembles the corresponding upper tooth, having a very small and simple crown supported on a single root. The succeeding premolars increase regularly in size up to the fourth; essentially they are all alike—compressed, trenchant, acute and quite high cones; on $\overline{\text{p. 3}}$, and more distinctly on $\overline{\text{p. 4}}$, a posterior basal cusp and cingulum appear, but they are less developed than in *C. latrans.*

The first, or sectorial molar, is characteristically cynoid, but retains some primitive features. Compared with the inferior sectorial of the coyote, the following differences are apparent: (1) The protoconid is relatively higher, less compressed, and more conical in shape, shorter in the fore and aft dimension, and its anterior border is much more steeply inclined and nearly vertical; (2) the paraconid is lower and less extended antero-posteriorly; (3) the talon is lower, and, while it is as broad as the anterior portion of the crown (trigonid), and therefore entirely different from that of *Temnocyon,* yet its basin-like character is less emphasized than that of *Canis,* owing to the smaller size and less elevation of the entoconid; the metaconid corresponds in size and position to that of *Canis.* The differences enumerated are slight and yet not without importance; for whenever the sectorial of *Cynodesmus* departs in structure from that of *Canis,* it is in the direction of *Daphœnus* and the creodonts. $\overline{\text{M. 2}}$ differs in no tangible respect from that of the coyote. $\overline{\text{M. 3}}$ is not so much reduced as in that species and has a more elongate oval crown, which is supported on two fangs, while, in the recent representatives of the family, the fang is very generally single.

II. The Skull. The skull preserves many of the primitive characters which occur in the ancient genera, such as *Temnocyon* and *Daphœnus.* This is particularly marked in the long, narrow cranium, with postorbital constriction placed far back of the orbits, and the short face, which is due partly to the microdont dentition and the anterior position of the orbits, they being farther forward than in *Canis.* The basicranial axis, as measured by Huxley's method (No. 19, p. 239), is strikingly long, actually exceeding that of the considerably larger skull of *C. latrans.* This elongation of the cranium does not, however, imply a correspondingly long cerebral fossa, as may be seen from the position of the postorbital constriction, which marks the anterior boundary of the hemispheres, and which, in this genus, is much farther removed from the orbits than in the recent members of the family, in which it follows close behind the orbits. The cerebral fossa is not only narrow, therefore, but it is short, extending only slightly above the cerebellar fossa, and the lengthening of the basicranial axis more particularly affects the floor of the latter. In the fossil which is under description, the roof of the brain-case and the occiput, together with the condyles, have been weathered away, and therefore the conformation of the sagittal and occipital crests cannot be determined with certainty; but, from the character of the frontal ridges and the shape of the cranial cast, which is well preserved, there can be little doubt that these crests were very much as in *Temnocyon coryphæus*, to the skull of which species that of *Cynodesmus* bears a very close resemblance.

The upper contour of the skull is nearly straight and the descent at the forehead very slight and gradual, in which respect we find a great similarity in shape to the fox's skull. The basioccipital (so much of it as is preserved) is narrower than in *Canis*, broader and more flattened than in *Temnocyon;* in the latter, this bone is anteriorly much narrowed by the extremely large bullæ, and posteriorly displays a median longitudinal convexity, with a deep fossa on each side of it. In the species before us, the paroccipital process is very different from that of *Canis;* in the latter it is "long and prominent, and its anterior surface is applied closely to the back part of the bulla, but to a less extent than in the cats, as the process is more compressed. The mastoid is distinct but slightly developed" (Flower, No. 14, p. 24). In *Cynodesmus*, as in *Temnocyon*, the paroccipital process is much longer, more compressed, and more curved downward and backward; its free portion is much more widely separated from the bulla, with which the process is connected by a narrow bridge of bone, which expands anteriorly so that the contact surface between the two is about as in the existing genus. The mastoid is somewhat more exposed on the surface of the cranium than in *Canis* and is more lateral in position, the paroccipital processes occupying the inferior angles of the occiput. This displaces the mastoid processes anteriorly, so that, as in *Temnocyon*, they are on the sides of the skull and overlapped by the squamosal; they are somewhat more developed than in *Canis*. The tympanics are inflated into large auditory bullæ, which equal in actual size, and therefore proportionally exceed, those of *Canis latrans*, though they are much less prominent than in *Temnocyon coryphæus*. So far as can be judged from the specimen, the bulla appears to be divided by a septum, in very much the same manner as in *Canis*, into two widely communicating chambers, of which the postero-internal is much the larger. The meatus auditorius is an irregularly oval opening, which does not form a tube; the anterior lip is, however, extended outward more than in *Canis* and, separated only by a narrow slit from the postglenoid process of the squamosal, articulates with it at its extremity. The shape and development of the bulla produce some differences in the disposition of the foramina in its neighborhood; thus, the foramen lacerum posterius extends less around the hinder end of the bulla and is confined to its postero-internal angle, running almost parallel to the basicranial axis. Still more important is the fact that the anterior lip of the auditory meatus, extending along the postglenoid process, overlaps and conceals the glenoid foramen. Indeed, I cannot altogether satisfy myself that the foramen is present at all; but there is a long, narrow and curved slit between the lip and the process, which probably contains the entrance to the foramen. In *Temnocyon coryphæus* the foramen occupies the position of the slit just mentioned, but is much more conspicuous, resembling the same structure in the raccoon.

The zygomatic arches are relatively longer and more massive than in *Canis;* they arch outward as far, but much less strongly upward, and thus, when seen from the side, pursue a straighter course. The root of the zygomatic process of the squamosal is continued backward as a broad shelf over the mastoid process, as is also the case in *Temnocyon coryphæus* though not in *Canis.* The glenoid cavity is more extended transversely than in the latter, and is more concave, the hinder margin being elevated into a ridge, which rises gradually into the postglenoid process, which is longer and more curved anteriorly than in the coyote. The jugal is very long and extends backward to the outer angle of the glenoid cavity; the masseter ridge is more prominent and rugose, and the masseter surface wider than in the recent animal; the postorbital angle, which is but slightly developed in the latter, does not appear at all. The anterior end of the jugal is bifurcate and the inferior branch descends lower upon the molar alveolus than in the coyote. The lachrymal has about the same extent upon the face as in that species, but possesses a spine in the form of an obtuse ridge; the foramen is single and placed entirely within the orbit.

The specimen does not permit us to determine the share taken by the frontals in forming the roof of the cranium, but they possess considerable extension upon the face. The supraciliary ridges are well marked and rugose and converge rapidly to form the sagittal crest; clearly, no lyrate "sagittal area" could have been present. The forehead is not so flattened as in *Temnocyon*, but slightly arched from side to side, and the postorbital processes are hardly more developed than in that form and consequently much less so than in *Canis latrans.* The nasal processes are very long and nearly reach the premaxillaries, though in this respect there is some asymmetry in the specimen, the process on the left side being appreciably longer than that on the right. Small frontal sinuses are present. The nasals are relatively long, and are broader and more convex from side to side than in the coyote; the anterior border is not emarginate, but obliquely truncate and considerably longer than in the recent animal. The anterior nares are higher, more oval in shape and more inclined backward than in *Temnocyon coryphœus*, less so than in *Canis latrans*. In the former they are small, nearly circular in shape and vertical in position. The horizontal portion of the premaxillæ is shorter, less massive and rounded than in the coyote, in correlation with the smaller incisors, and at the symphysis the two are less closely applied. The ascending portion is also quite differently shaped; it is much longer, broader and more steeply inclined, and its superior and anterior borders pass into each other almost imperceptibly, while in the coyote the two meet at an angle not very much greater than a right angle. The palatal portion differs but little from that seen in the latter species, but the incisive foramina are somewhat more anterior in position and encroach less upon the maxillaries.

The maxillary, in its extension upon the face, is short, but relatively deep vertically, and this height rapidly increases backward, so that the premaxillary suture is steeply inclined. The canine alveoli cause more marked prominences upon the face than in *Canis latrans*, and the muzzle is more constricted behind them. The infraorbital foramen is nearer to the orbit than in that species, but occupies the same position with reference to the teeth, opening above the interval between $\underline{\text{p. 3}}$ and $\underline{\text{p. 4}}$. The palatal processes are somewhat narrower than in the coyote, and the suture between them is marked by a low rugose ridge. The palatines have a less extent, both in length and breadth, than in the modern form, their anterior borders, which in the latter reach to the interval between $\underline{\text{p. 3}}$ and $\underline{\text{p. 4}}$, hardly extending beyond the middle of the sectorial. On the other hand, the front margin of the posterior nares is quite behind the molar alveoli, while in the coyote it is opposite the front of $\underline{\text{m. 2}}$; the palatal notches are also much less deeply marked than in the latter. The posterior nares are long and narrow and somewhat constricted in the middle of their course; the pterygoids have larger hamular processes than in the coyote and the pterygoid fossæ are better marked.

The mandible differs in important respects from that of *Canis latrans*. The horizontal ramus is shorter, but deeper and thicker; the chin rises more steeply, which produces less procumbency in the incisors; the lower border is more sinuously curved, descending more abruptly from beneath the coronoid, and the angular hook longer and stouter. The ascending ramus has a greater antero-posterior extent, and the coronoid is broader, more inclined backward, and with more curved posterior margin; its anterior border is wider and more distinctly defined and displays a groove for the attachment of the buccinator and maxillo-labial muscles, which would seem to indicate that these muscles were better developed than in the existing form. This broad anterior surface is reflected over upon the upper border, where it forms a very distinctly marked, flattened and obliquely inclined surface for the insertion of the temporal muscle; its upper margin, however, is a thin edge, not thickened and rugose as in the coyote; its lower margin forms the upper boundary of the masseteric fossa and is continuous with the prominent ridge which bounds that depression anteriorly. The nearest approximation to this character of the coronoid which I have been able to find among the recent *Canidæ* occurs in *C. cinereo-argentatus.* The masseteric fossa is large and profound, indicating a powerful muscle, which is further confirmed by the character of the surface on the jugal for the origin of the masseter. The condyle is somewhat flattened upon its postero-superior aspect; it is much more extended transversely than in *Canis latrans,* and this extension is most marked in the portion external to the coronoid.

The cranial foramina, with the exception of the foramen lacerum posterius and the glenoid foramen, which have already been noticed, depart in no respect from those of *Canis.* The mandible has a large mental foramen beneath $\overline{\text{p. 2}}$ and a smaller one under $\overline{\text{p. 3}}$, which are closer together than in the coyote; the dental foramen occupies the same position as in that species.

III. *The Brain.* The cranial cast displays characters very different from those of the recent *Canidæ*, both in its general proportions and in the details of the cerebral convolutions. The hemispheres are narrow in proportion to their length and taper gradually forward; their contour is rather more alopecoid than thooid, according to Huxley's distinctions. "In the Fox the contour of the brain, viewed from above, is that of a pear with the narrow end forwards, laterally the contour is undulated, presenting one slight incurvation in the region of the sylvian sulcus and another in that of the supraorbital [*i. e.*, presylvian] sulcus, while a little angulation marks the junction of the olfactory lobes with the cerebral hemispheres. In *Canis azaræ* the cerebral hemispheres immediately behind the supraorbital fissure widen out abruptly and the lateral contour, instead of being slightly incurved at this point, presents a sharp rectangular inflection. The frontal lobe anterior to the supraorbital sulcus is much longer in *C. azaræ* than in *C. vulpes* and the brain is considerably wider behind in the latter" (No. 19, pp. 245–247). In *Cynodesmus,* the posterior widening of the alopecoid brain does not occur, but the anterior portion is more like what occurs in those animals than in the thooids, though simpler than in either. The hemispheres slightly overlap the lateral lobes of the cerebellum, but are notched in the middle, so as to leave the vermis free. Owing to the relatively well-developed tempero-sphenoidal lobes, the cerebrum has considerable vertical depth in this region, but anteriorly it is very shallow as well as narrow. Apparently, the hemispheres leave the olfactory lobes quite exposed. Except for its greater width posteriorly, the brain of the fennec (*Canis zerda*) has a very similar outline to that of the fossil.

We can best examine the sulci of the hemispheres after quoting Krueg's description of the fissures which are characteristic of the recent *Canidæ:* "Fissura anterior und postica sind immer vorhanden, fast immer verbunden. Fissura coronalis, ansata, lateralis, medilateralis meistens verbunden, letztere sowie die ectolateralis immer vorhanden. Die Fissura splenialis ist häufig mit der rhinalis posterior, nur ausnahmsweise nicht mit der cruciata verbunden. Die Fissura prorea, præcruciata, postcruciata und confinis fehlen häufig und sind auch bei den grösseren Species nie stark entwickelt" (No. 21, p. 614). In *Cynodesmus* the cerebral convolutions are much simpler than in any existing species of *Canidæ,* even the smallest. Besides the sylvian fissure, the dorsal aspect of the hemispheres displays but two slightly curved sulci, one of which, the superior, is clearly the lateral sulcus; its anterior portion may, perhaps, represent the ansate and coronal fissures, but if so, all three are in the same straight line. In the recent species the three are usually connected, but with the difference that the ansate and coronal sulci are curved downwards and forwards, out of the line taken by the lateral. The second fissure in the specimen is the suprasylvian, which is remarkably short and little curved, and is not continued into the posterior suprasylvian, which appears to be absent. The crucial fissure is not indicated on the cast, but no great stress can be laid upon this fact, for this sulcus is sometimes not shown in the intracranial casts of recent species, the brains of which actually possess it. If present, however, in *Cynodesmus,* it must have been extremely short, as is shown by the straight course of the lateral sulcus and its nearness to the dividing fissure between the two hemispheres. Among several brain casts of Miocene carnivores, I have seen none which displays the crucial sulcus, though we can scarcely believe that this fissure, which is now so characteristic of the recent families of the order, had not then been developed.

One very striking difference between the cerebral sulci of *Cynodesmus* and those of the existing dogs, is the absence in the former of the posterior prolongation and downward curvature of the fissures. The medilateral is lacking, and a minute, isolated depression is all that can represent the ectolateral. Nor do I find any trace of the presylvian (supraorbital) sulcus, or of the "fissura anterior und postica," which, in the recent species, are always present and nearly always connected to form a strongly curved sulcus between the sylvian and the suprasylvian. It is of interest to note that this brain, in its simplicity of convolution, is much more like that of fœtal dogs than of any adult recent species. Among existing carnivora, we find such simple sulci approximated only in some of the smaller viverrines and mustelines.

The cerebellum does not differ in any important respect from that of recent dogs, except that it is less extensively covered by the hemispheres. The vermis is prominent and well convoluted, and is principally extended upon the dorsal side. The lateral lobes are somewhat injured by weathering, so that the degree of their convolution is not apparent.

In the subjoined table, comparative measurements are given of the skulls of *Cynodesmus, Temnocyon coryphæus* and *Canis latrans.* Under each species, the first column gives the actual dimensions in millimeters, while in the second column are the proportionate measures, by Huxley's method, the length of the basicranial axis in each case being taken as 100. These figures are calculated only to the nearest integer, the fractions representing amounts which are far within the limits of individual variation.

	Cynodesmus.		C. latrans.		T. coryphæus.	
	M.	Axis = 100.	M.	Axis = 100.	M.	Axis = 100.
Length of basicranial axis	.066	100	.061	100	.066	100
Total length of skull	.147	223	.161	264	.153	234
Length of face	.048	73	.073	120	.056	85
Length of zygoma	.074	112	.072	119	.074	112
Width across zygomas	.106	161	.098	161	....	....
Length upper molar-premolar series	.052	79	.069	113	.055	83
Length of upper sectorial	.015	23	.020	33	.017	26
Width of upper sectorial	.011	17	.009	15	.011	15
Length of first upper molar	.011	17	.013	21	.010	15
Width of first upper molar	.016	24	.017	28	.016	24
Length of second upper molar	.007	11	.008	13	.004	6
Width of second upper molar	.010	15	.012	20	.009	14
Width of palate at *p. 4*	.043	65	.052	85	.050	76
Length of auditory bulla	.024	37	.023	38	.027	39
Length of mandible	.113	171	.130	212	....	....
Length of first lower molar	.017	26	.021	34	....	....
Length of second lower molar	.008	12	.010	16	....	....
Length of third lower molar	.005	8	.005	8	....	....

It should be added that, in *Cynodesmus*, the length given for the basicranial axis is approximate only, the margins of the foramen magnum being broken away, but the error cannot be sufficient to detract from the substantial accuracy of the results.

This beautiful specimen was found in the lower beds of Deep River valley by Prof. O. C. Mortson.

The Systematic Position of Cynodesmus.

Of the phylogeny of the *Canidæ*, which has so long remained obscure and puzzling, Schlosser says: "Die Abstammung des Hundes ist noch immer mehr oder weniger in Dunkel gehüllt. Es sind zwar eine grosse Menge fossiler Fleischfresser bekannt, die jedenfalls in näherer oder entfernter Beziehung zu dieser Gruppe stehen, allein da von denselben das Skelet entweder noch nicht gefunden ist oder doch von jenem der Hunde sehr bedeutend abweicht, so bleiben wir noch immer über die eigentlichen Ahnen des Hundegeschlechtes fast ganz und gar im Ungewissen" (No. 29, p. 247). The gradual recovery of the dogs of the American Miocene formations is bringing us nearer to a satisfactory solution of this difficult problem. As Schlosser has pointed out, the numerous cynoids of the European Oligocene, with the possible exception of some species of *Cynodictis*, can be of little phylogenetic significance, and in the lower Miocene of Europe the dogs disappear completely; they are represented in the upper Miocene and Pliocene by only a few remains, and do not attain great importance till the Pleistocene (No. 30, p. 488). Throughout the American Miocenes, however, from the White River to the Loup Fork, they play a very important part, and are not only abundant in individuals, but very varied in type, no less than nine genera of Miocene dogs, most of them containing several species, having been described from the different American horizons. This fact of itself would indicate the greater probability of an American rather than a European origin of the family.

In the Loup Fork beds, aside from the aberrant *Ælurodon*, several species of cynoids occur which are indistinguishable from *Canis*, and, so far as the remains at present known are concerned, must be referred to that genus, though complete material will probably require their separation from it. One of these species, *C. brachypus* Cope, is very probably of phylogenetic importance and is significantly like *Cynodesmus*. This is a microdont species, which retains many primitive characters, such as the small sectorials, short face, long cranium, elevated sagittal crest and weak feet. The lower Loup Fork strata of the Deep River valley (*Cyclopidius* beds) contain a possible species of *Canis*, the *C.? anceps*, which will be hereafter described. So far as this form is known, it is intermediate between the *C. brachypus* and *Cynodesmus*. The latter genus is found in the lower Deep River beds, which we have already referred to the summit of the John Day horizon, and its connection with *C. brachypus* is a fairly close one, as is apparent not only in the dentition but in the characters of the skull as well; as, for example, in the characteristic shape and connections of the paroccipital processes, length of the zygomatic arches, size and shape of the coronoid process of the mandible, etc. We may also fairly assume that "the elevated sagittal crest and the small feet" are shared by the older genus. The White River type, *Daphœnus*, is separated from *Cynodesmus* by a wider interval, the typical John Day horizon, in Oregon, not having as yet yielded any form which can be placed in the series, unless we are to find the missing link in the species referred provisionally to *Temnocyon* by Cope, under the name of *T. josephi;* but until the mandibular dentition of that species is discovered, its place in the cynoid series must remain indeterminate. In spite, however, of the considerable gap between *Cynodesmus* and *Daphænus*, their relationship is indicated by nearly every detail of known structure in the two genera. The skull characters are closely similar in both; *e. g*, the long, narrow cranium, with postorbital constriction placed far back of the orbits, and the short, rapidly tapering face. *Cynodesmus* shows advance over *Daphænus* in the following particulars: (1) The auditory bullæ are enlarged, fully ossified and the posterior chamber indistinguishably fused with the anterior, while in the White River genus the posterior chamber remains cartilaginous, or, at all events, is separate from the anterior. In all the skulls which I have had the opportunity of examining, the posterior chamber is lost, exposing the periotic from below, and the anterior chamber is very small. (2) The cranium is somewhat more rounded and capacious, and it, together with the zygomatic arches and ascending ramus of the mandible, has become somewhat shortened. (3) The sectorials are rather more modernized and efficient shearing blades, the cusps being more compressed and extended and less conical in form; in $\underline{\text{p. }4}$ the deuterocone is reduced. (4) The third upper molar has disappeared. (5) The first upper molar has become smaller and the outer cusps moved nearer to the edge of the crown.

Temnocyon represents a slightly modified side branch, in which the inferior sectorial has developed a trenchant talon, through the reduction or suppression of the entoconid. In all other respects, the true canine character of *Temnocyon* and its close resemblance in skull structure to *Cynodesmus* are very striking. Whether *T. coryphæus* and *T. altigenis* are properly placed in the same genus, or whether, as Schlosser suggests, they belong to widely separated phyla, need not be discussed here, nor can we determine at present whether *Temnocyon* and *Cynodesmus* have any common ancestor nearer than *Daphænus*. *Icticyon* alone, among recent dogs, shares with *Temnocyon* the character of the trenchant talon on the inferior sectorial. As this character is a rare one, both in fossil and recent cynoids, we may, perhaps, expect that the existing South American genus will prove to be derived from the John Day type. If so, many intermediate forms remain to be discovered.

Daphænus, in the structure of its skull, dentition and limbs, approximates closely to the creodonts. This approximation is seen in the character of the sectorials, which are very like those of the *Miacidæ*, in the primitive form of the cranium, in the low humeral trochlea with its epicondylar foramen, in the third trochanter of the femur, the creodont-like calcaneum and the relatively weak plantigrade feet. The cynoids of the Uinta formation are, unfortunately, not sufficiently well known for generic or even ordinal reference, as it is uncertain whether they are carnivores or creodonts, but it is altogether likely that they will prove to be intermediate between *Daphœnus* and the *Miacidæ* of the Bridger.

The great difficulty in the way of making out a satisfactory phylogeny of the *Canidæ* is the position to be assigned to the problematical genus *Otocyon*. If, as so many authorities maintain, it be inadmissible to assume that in this form the number of teeth has been increased at a comparatively recent period and within the limits of the family, then we shall be driven to admit a very remarkable degree of parallelism, or rather of convergence. Either the series of fossil forms which lead by slight and natural gradations from the *Miacidæ* to *Canis* have nothing to do with existing species, but merely form a parallel series, leading to no permanent result, while the real ancestors of the family are entirely unknown; or, on the other hand, *Otocyon* must represent the termination of a line leading upwards from some creodont family, as yet undiscovered, which line has paralleled the dogs in every detail of structure except the dentition. For my own part, I am by no means convinced of the impossibility of the addition of new teeth to the molar series. That modification in the mammalian lines is very generally by way of reduction in the number of teeth, is true, but does not prove that the reverse process may not exceptionally take place, whether by reversion or otherwise. The great simplicity of the teeth in *Otocyon* can hardly be reconciled with its advance in all other respects, except on the hypothesis of a retrogression or reversion in dental structure. At all events, such an assumption would seem to involve less of improbability than either horn of the dilemma to which its rejection confines us.

Stress has been laid upon the lyrate sagittal area of *Otocyon* and its occurrence in the young of other species of the family as showing that it is a primitive character. But an examination of a series of fossils in almost any mammalian phylum shows that the high and thin sagittal crest is the primitive character, and its replacement by a flattened area the secondary modification. The reason for this is plain; in the ancient forms, the jaws and canine teeth are powerful and the brain is small, hence the cranium does not offer sufficient surface for the attachment of the temporal muscles, and the sagittal crest must be developed, just as in the analogous case of the sternal keel in birds. Now, the disproportionately large size of the brain in the young animal gives a large surface for muscular attachment at a period when the weak jaws and small milk teeth require little muscular power, and hence the development of the crest is retarded. In no embryonic structure are there so many "cenogenetic" features as the skull, just on account of the great and premature enlargement of the nervous axis and the higher sense organs, and hence embryological data must be applied with great caution in discussing questions of skull morphology. For the same reason, the sagittal crest is relatively less developed in very small forms, as is exemplified in the small species of *Cynodictis* from the White River and John Day, and in the least of these, *C.* (*Galecynus*) *lemur*, a lyrate area is formed, the most ancient known cynoid in which it occurs. A sagittal area also occurs in the White River insectivores, *Leptictis* and *Ictops*, but it is worthy of note that it is not marked in the older species of the latter, from the base of the Bridger.

There are equally good reasons for regarding the lobate mandible which is found in many of the recent *Canidæ* as a secondary modification. It not only is absent in all Miocene members of the family and all known creodonts, but, so far as I can ascertain, it occurs only in those recent species in which the mandibular condyle is much elevated above the level of the molars, and this is by no means a primitive character.

The following table will serve to display the relationships of the various American genera of the cynoid stem, so far as the available material renders this possible:

Loup Fork, . . .	*?Canis, Ælurodon.*	
John Day, . .	*Cynodesmus, Temnocyon,*	*Cynodictis.*
White River, . .	*Daphœnus,*	*Cynodictis.*
Uinta, . . .	?	
Bridger, . . .	*Miacis.*	

CANIS.

? Canis anceps Scott.

Amer. Naturalist, 1893, p. 660.

A small fragment of mandible, containing the last premolar, first and second molars, is provisionally referred to this genus. It agrees well with Cope's description of *Canis brachypus* from the Loup Fork (No. 4, p. 389), except for its inferior size and relatively more slender mandibular ramus. The inferior sectorial is nearly as long as in that species, in the proportion of 17 to 19, but the depth of the jaw beneath that tooth is much less, as 21 to 30. Possibly the species should be referred to *Cynodesmus*, but several minute details point rather to *Canis*.

The sectorial is very like that of *Cynodesmus;* it is marked by a very short (antero-posteriorly) paraconid and high conical protoconid, which has a very steeply inclined anterior edge; the talon, however, is somewhat more modernized by the increase in size of the entoconid, which bears about the same proportion to the hypoconid as in *Canis latrans*, and, as in that species, a minute cusp is present between the base of the metaconid and the entoconid, which does not occur in *Cynodesmus*. The second molar is like that of *C. latrans*, except for the larger size of the entoconid, which in the modern species is reduced to a mere ridge. The third molar is missing, but its alveolus shows it to have been larger than in the coyote, and the fragment of mandible displays a deeper and thicker horizontal ramus than in that species.

Measurements.

	M.
Length of first lower molar (antero-posterior)	.017
Length of second lower molar	.008
Length of third lower molar alveolus	.006
Depth of mandible beneath $\overline{\text{m. 1}}$	.021

The type specimen of this species was found in the *Cyclopidius* beds of the Deep River by Mr. I. Benet.

RODENTIA.

Castoridæ.

STENEOFIBER.

This genus may be distinguished from the nearly allied *Castor* not only by the simpler pattern and less markedly prismatic character of the molar teeth, but also by the absence of coössification between the fibula and tibia. In the American species the humerus always has an epicondylar foramen.

Steneofiber montanus Scott.

Amer. Naturalist, 1893, p. 660.

This species is most like the *S.* (*Castor*) *peninsulatus* Cope, from the typical John Day horizon, but differs from it in some details of molar construction. In the upper molars, except $\underline{\text{m. 3}}$, there are but two fossettes, both of which are anterior to the external enamel inflection; the latter also is nearer to the posterior border of the crown than in the other species of the genus. In the lower molars there is, as in the other species, "a deep external enamel inflection and three transverse lakes on the inner side;" but different from any of the other members of the group, the external inflection is hardly at all oblique in its course, but runs nearly parallel to the fore and aft axis of the tooth. In both of the lower teeth represented in the specimen, the antero-posterior diameter of the crown exceeds the transverse, which is very unusual in this genus. The incisors are narrow, with anterior faces which are less convex than in *Castor* and are covered with a thick layer of orange-colored enamel.

Two caudal vertebræ indicate that this species had a longer and more slender tail than the beaver; the anterior portion was provided with chevron bones.

The humerus has a rather slender, trihedral shaft and prominent deltoid ridge, which terminates in a massive overhanging hook; this hook is proportionately even better developed than in *Castor*. The supinator ridge is also conspicuous and continues high up upon the posterior aspect of the shaft. The trochlea is low and narrow, more so than in the beaver, but otherwise shaped as in that animal, and the anconeal fossa is very shallow, not so deep, in fact, as the supratrochlear. The internal epicondyle is very prominent, massive and rugose, and is perforated by a large foramen.

The femoral trochanters are well developed, but the third is placed more proximally than in *S. peninsulatus* or in the beaver. The calcaneum has a short, depressed, irregular and club-shaped tuber; the sustentaculum is notably smaller than in the modern species, and the external projection near the distal end much more prominent; the cuboidal surface is of triangular outline and slightly concave. Of the metatarsals only the third is preserved in the specimen, but this is sufficient to show that in this species of *Steneofiber*, at least, the foot had very different proportions from what we find in the existing genus. This metatarsal is relatively very much more slender and shorter than in *Castor* and of quite different shape, as the shaft is of nearly uniform size throughout, not being contracted in the middle nor expanded distally; it is also more depressed and flattened, and the head for the first phalanx less enlarged. The proximal end has an oblique surface for the ectocuneiform, which is abruptly constricted behind and continued as a narrow posterior tongue. This specimen suggests very strongly that when *Steneofiber* becomes completely known it will prove to be much better distinguished from *Castor* than the skull and dentition have led us to suppose.

Measurements.

	M.
Length of first upper molar	.004
Width of first upper molar	.005
Length of second upper molar	.004
Width of second upper molar	.005
Length of third upper molar	.003

Width of third upper molar	.004
Length of lower molar	.005
Width of lower molar	.004
Length of third metatarsal	,019

The specimen was found in the upper John Day beds of Deep River by Mr. C. C. Jefferson.

PERISSODACTYLA.

Equidæ.

The name *Anchitherium* has been very extensively applied to all those genera of American equines from the different Miocene horizons which have molariform premolars and short-crowned molars free from cement. Marsh was the first to suggest the removal of the American species from this genus (No. 26, p. 248, and No. 25, p. 249), and gave the names *Mesohippus* and *Miohippus* to the species from the White River and John Day beds respectively, though retaining the older term for some forms from the latter group. However, the characters upon which these proposed genera were founded, are quite insufficient for the purpose, and hence they have not been widely adopted. Nevertheless, in my judgment, the separation may be justified upon very different grounds and the genera established upon significant structural characters. The distinction between *Mesohippus*, on the one hand, and *Miohippus*, on the other, is still somewhat uncertain, though quite probable, but their common differences from *Anchitherium* are clear. The American genera may be confidently regarded as important members of the equine stem, while *Anchitherium*, from present information, would appear to belong to an abortive side branch, leading to no permanent results. The discovery in this country of a very large *Anchitherium* of the type of the European *A. aurelianense*, which will be described in the sequel, is somewhat unexpected and promises to be of twofold service, both in determining the morphological significance and systematic position of this genus and in correlating the upper Miocene horizons of the Old World and the New. The uncertainty which still attends the latter question is often a most serious obstacle in working out the problems of phylogeny, as well as in attempting to decipher the complex history of ancient migrations and to determine in what region a given type originated.

The following table will display some of the more important differences which separate the successive forms of horses occurring in the American Miocene formations, though there will, of course, be various opinions as to the taxonomic value of these characters.

I. Teeth brachyodont.

A. Conules of upper cheek teeth well marked; posterior transverse crest not reaching the outer wall; external cusps moderately concave or flattened; anterior pillar of lower teeth distinctly marked.

1. No cement present.

a. Incisors without enamel invagination..***Mesohippus*.

b. Upper incisors with enamel pit..*Miohippus*.

2. Cement on cheek-teeth.

Posterior transverse crest of upper molars and premolars confluent with outer wall..........*Desmatippus*.

B. Conules of upper cheek-teeth much reduced and external cusps deeply concave; posterior transverse crest extending to outer wall; anterior pillar reduced and on one or more lower teeth absent; no cement..*Anchitherium*.

II. Teeth hypsodont.

1. Antero-internal cusp of upper cheek-teeth confluent with anterior crest...........................*Protohippus*.

2. Antero-internal cusp separate from transverse crest...*Hipparion*.

MIOHIPPUS Marsh.

American Journ. Science, Third Series, Vol. VII, p. 249.

(Syn. *Anchitherium* Leidy, Cope and Marsh, in part.)

This genus was proposed on the absence of the lachrymal fossa in the type species, but Prof. Cope informs me that this character is not of more than specific value, as in *Protohippus* and *Hipparion*, as well as in the John Day genus, some species have it, while others lack it. As shown in the foregoing table, *Miohippus* is sufficiently well distinguished from *Anchitherium*, but the propriety of its separation from *Mesohippus* must remain doubtful until the upper incisors of the latter genus have been found.

The John Day species have all been established on characters taken from the upper molars, and, as there are no upper teeth comprised in the present collection, the reference of the species can only be approximate.

MIOHIPPUS EQUICEPS? Cope.

(Syn. *Anchitherium equiceps* Cope, *Proceedings Philos. Soc.*, Vol. XVIII.)

The lower beds of the Deep River (*i. e.*, upper John Day) yielded some mandibles which agree fairly well with the smaller individuals of this species, to which they may be provisionally referred.

* The upper incisors of this genus are not known, and future discovery may show that it is not generically different from *Miohippus*, but the generally less advanced character of the dentition renders it probable that the character of the incisors is as assumed above.

MIOHIPPUS ANNECTENS? Marsh.

(Pl. I, Figs. 6–8.)

(*loc. cit.*)

A fine specimen of a hind limb from the lower beds, not accompanied by teeth, corresponds closely to the measurements given by Marsh of this, the type species of the genus. The femur differs little, except in size, from that of *Mesohippus;* it is relatively longer, more nearly equalling the length of the tibia. The head rises as much above the bridge which extends to the great trochanter, but is more approximated to that process, and the pit for the round ligament is wider and more equine in shape. The head projects to a remarkable extent in front of the anterior plane of the shaft. The shaft is laterally compressed, and narrow when seen from the front, but of considerable antero-posterior diameter. The pit above the external condyle for the attachment of the plantaris muscle is very deep and conspicuous. The condyles are rather small and do not project strongly backward, but are more prominent and separated by a deeper groove than in *Mesohippus.* Another difference from the latter genus is seen in the greater elevation and thickening of the inner border of the rotular trochlea, though this by no means attains the proportions found in *Equus.*

The tibia is almost an enlarged copy of that of the White River genus. The condyles for the femur are brought somewhat closer together and extended farther backward and the cnemial crest is rather more prominent; the shaft is rather stouter and the distal end more expanded. The inner malleolus is more massive and the grooves for the astragalus somewhat more deeply incised; the inner groove exceeds the outer in antero-posterior extent in a more marked degree. About two inches of the distal end of the fibula is firmly coössified with the tibia, forming a stout external malleolus, which bears a small facet for the calcaneum. The proximal portion does not appear to have coalesced with the tibia, and is lost; nor can we determine whether the exceedingly slender shaft was interrupted.

Beyond the mere increase in size, the tarsus shows surprisingly little advance over that of *Mesohippus.* The calcaneum retains the long, slender tuber with nearly parallel dorsal and plantar borders; the distal part is a very little shorter in proportion, so little that the difference is probably individual. The cuboidal facet is longer, more distinctly separated into anterior and posterior portions, and the latter is more incurved toward the sustentaculum, which constitutes an advance toward the modern standard. The other facets show no change.

The astragalus likewise presents no noteworthy differences other than the extension of the distal end, especially towards the tibial side. The small sulcus which is very generally, though not invariably, found on the navicular surface in *Mesohippus,* does not occur in the specimen, but in all probability this is an individual, or, at most, a species character.

The navicular is a little lower relatively, and has also increased in transverse breadth, more particularly towards the internal or tibial side. The posterior margin of the astragalar surface is less elevated and less widely notched, and the posterior projection which extends towards the cuboid is less prominent. As in the case of the astragalus, the corresponding sulcus is absent. On the distal side, the facet for the ectocuneiform has increased in size, and that for the combined meso- and ento-cuneiforms has become somewhat more posterior in position. The anterior face of the navicular is decidedly less curved.

The cuboid has slightly increased its dorso-plantar diameter and the posterior hook has become decidedly more massive and rugose, even more so relatively than in *Equus*. The astragalar surface is wider, and the hinder part of the calcaneal facet broader, more incurved and more equine in shape.

The ectocuneiform is broader and lower, but otherwise as in *Mesohippus*. Although the animal was fully adult, the suture between the ento- and mesocuneiforms is very clearly shown, much more so than in any White River specimen which has come under my observation, and the ankylosis of the two elements appears to be a somewhat loose one. This, again, is doubtless an individual character. The ento-cuneiform in both genera extends across to a contact with the cuboid, though in *Miohippus* it is relatively larger, especially in vertical diameter. The navicular facet on the mesocuneiform is somewhat more concave and rises higher behind.

In the metatarsals, the only noteworthy change is in the increase in size of the median one, though its articulations remain as before; it is still excluded from contact with the mesocuneiform by the junction of the second metatarsal with the ecto-cuneiform, which is very limited.

Measurements.

	M.
Length of femur	.225
Width of distal end (transverse)	.047
Depth of distal end (fore and aft)	.057
Length of tibia	.262
Width of proximal end	.050
Depth of proximal end	.048
Width of distal end (including fibula)	.037
Depth of distal end at inner astragalar groove	.026
Length of calcaneum	.068
Length of astragalus	.032
Width of astragalus head	.022
Width of proximal end of third metatarsal	.020
Depth of proximal end of third metatarsal	.016

This specimen was found by Prof. W. F. Magie in the lower beds of the Deep River valley.

Miohippus sp.

What is probably a third species of this genus is represented by teeth and limb bones from the *upper* beds (lower Loup Fork), the specific reference of which is uncertain in the absence of the characteristic upper molars. In size, this animal about equals the *M.* (*Anchitherium*) *brachylophus* Cope from the John Day, and is therefore one of the smaller forms which exceed *Mesohippus* in stature but relatively little. Fragmentary as they are, these remains are of interest as showing the degree in which some members of a genus may retain their primitive characteristics, while descendants of the same genus have already advanced far on the road of specialization. To make clear the position of these late survivors, it will be most convenient to compare the specimens with the corresponding parts of *Mesohippus*, than which they are distinctly more modernized, though perhaps less than we should have expected.

The humerus has a somewhat more rounded and less laterally compressed shaft. The trochlea is decidedly more equine, lacking the peculiar flange which I have elsewhere described as occurring on the external side of the humeral trochlea in the White River genus. This external surface is continued much farther back upon the distal aspect of the trochlea, and thus there is not that conspicuous difference in vertical diameter between the external and internal portions of the trochlea which gives such a peculiar and characteristic appearance to the humerus of the older form. It should be added that the humerus of this species is more modernized than that of the John Day members of the genus, which still display some traces of the arrangement found in *Mesohippus*. Returning to the species under description, we find that the intertrochlear ridge is reduced, but is still much more prominent than in *Equus*, and the sulcus, which in the latter is placed at the bottom of the intertrochlear groove, is on the summit of the ridge; in *Mesohippus* it is wanting. The inner portion of the trochlea has its articular surface reflected farther back on the upper side than in the horse, which indicates a greater freedom of motion at the elbow joint. The internal epicondyle is reduced and, seen from this side, the distal end is a reduced copy of that of *Equus*.

Except for the position of the bicipital tubercle, which is still internal rather than anterior, the head of the radius is much more equine in appearance than that of *Mesohippus*. Not only is the peculiar external flange absent, but the head is wider and expanded much as in the horse. The shaft is likewise more flattened antero-posteriorly and broadened transversely. The distal end, however, retains its trihedral shape and the carpal facets differ in no important respect from those of the White River form. The distal end of the ulna is coössified with the radius to about the same extent as frequently, though not always, occurs in the latter.

The carpals exhibit numerous differences of detail from those of *Mesohippus*, many of which are to be correlated with the increase in size of the median digit. In general, the most noticeable change in the carpus is the increased breadth and decreased proportionate height of its elements. The scaphoid is broader and deeper (antero-posteriorly) relatively to its height, and on the radial surface the anterior ridge is higher and the posterior concavity deeper. The external contour of the radial facet is more deeply notched. The lunar differs in the greater width of the distal as compared with that of the proximal end, and the more nearly square outline of the radial surface, which is less contracted posteriorly. The magnum facet is also carried farther back. In these respects the lunar of the species before us is less equine than that of *Mesohippus*. On the other hand, it is more modernized in the greater breadth of the surface for the magnum in proportion to that for the unciform and in the open angle at which the two facets meet. The pisiform is more equine in being more expanded vertically and of more uniform height, contracting less towards the proximal end. The cuneiform facet is more oblique, presenting less downward and more forward, but is still only imperfectly divided into two parts. The trapezoid is very similar in the two genera. The magnum is much broader, especially anteriorly; this extension is chiefly towards the radial side and consists principally in a broadening of the scaphoid surface. Distally, we find the expansion for the median metacarpal more symmetrically formed on both sides of the posterior prolongation. The head of the magnum remains, as before, very narrow.

In the metacarpus the only noteworthy change is the expansion of the median and reduction of the lateral digits; in consequence of this, the magnum surface on mc. iii is decidedly changed in shape. The other carpal facets of the metacarpus remain very much as before. Mc. ii has the same connections with trapezium, trapezoid and magnum, and mc. iii with magnum and unciform, the latter facet being divided into two parts by a sulcus, which is somewhat better marked than in *Mesohippus*.

Measurements.

	M.
Breadth of humeral trochlea	.035
Length of radius	.159
Breadth of proximal end	.031
Breadth of distal end	.028
Width of head of mc. iii	.016
Depth of head of mc. iii	.014

DESMATIPPUS Scott.

Amer. Naturalist, 1893, p. 661.

Equines in which the dentition is intermediate in character between that of *Miohippus* and that of *Protohippus.* The molars and premolars are short crowned and have the valleys more or less filled with a thin deposit of cement. In the upper series, the posterior transverse crest is connected with the outer wall, and in the middle of its course sends forward a process which extends nearly to the anterior conule. The posterior pillar is enlarged, and on moderate wear becomes confluent with the postero-internal cusp. In the lower cheek-teeth the internal cusps are reflected and expanded antero-posteriorly, so as to narrow the entrances to the valleys. The median inner cusps (a a^1 of Rütimeyer) are much more distinctly separated than in *Anchitherium* or *Miohippus.*

DESMATIPPUS CRENIDENS Scott.

(Pl. II, Figs. 9–14.)

(*loc. cit.*)

Size moderate; limbs elongate and slender; posterior transverse crests of upper cheek teeth crenulate.

This interesting genus fills very completely and satisfactorily what was almost the only gap left in the equine phylum, viz., that between *Miohippus* and *Protohippus.* At first sight it might seem to be identical with the *Merychippus* of Leidy, but this genus was established upon two upper milk molars (No. 23, Pl. XVII, Figs. 3 and 4) of peculiar construction, the reference of which is still entirely uncertain. The permanent dentition which Leidy has referred to this genus differs altogether from that of *Desmatippus*, being much more like that of *Protohippus*, with which Cope identifies it.

The type specimen of the new genus consists of the dentition of both jaws, lacking the incisors, canines, first lower premolar and last upper molar, the mandible, portions of the radius and ulna, femur, manus and pes, and fragments of other bones. Other specimens, which should probably be referred to the same genus, though perhaps a different species, will be described in the sequel.

Dentition. A. Upper Jaw. The first premolar, though much smaller than the others, is relatively large and well developed, and is composed of four elements. The protocone, which is much the largest, is elongate, somewhat convex upon the outer face and displays a rounded projection upon its inner face. The tritocone is small, not very distinctly separated from the protocone, and is overlapped by the greatly extended anterior buttress or protostyle of $\underline{p.2}$. The deuterocone is represented by a long, low ridge, which is not connected by a transverse crest with the outer wall of the crown. The tetartocone is low and conical in shape; on wear it becomes confluent with the tritocone. Strange to say, this tooth is proportionately less reduced than in the White River equine, *Mesohippus*. The second premolar is the largest tooth in the series and differs in several details of construction from all the others; the enlargement affects particularly the anterior portion of the crown. The protocone (antero-external cusp) is elongate in the antero-posterior direction; it is but very slightly concave and the median rib is prominent. The protostyle, or anterior buttress, is greatly enlarged, and to it much of the characteristic appearance of the tooth is due. The tritocone is much shorter (from before backward) than the protocone, is more concave on the external side, and the median rib is nearly obsolete. The deuterocone is fused with the anterior conule, though a constriction indicates clearly the limits between them, and the thickness of the conule renders it a very conspicuous element of the crown; the anterior transverse crest is approximated to, but does not coalesce with, the outer wall. The tetartocone is somewhat less distinctly constricted from the large and prominent posterior conule, and this makes the posterior transverse crest very much broader than in *Anchitherium;* it is confluent with the outer wall, and the enamel on its anterior margin is slightly crenulate. The posterior pillar is large and of triangular shape; in the stage of wear exhibited by the specimen, the pillar has become confluent with the tetartocone, though the limits of the two cusps are marked by a fold in the enamel covering. A small pillar or style arises also from the anterior side of the tetartocone, but doubtless this, as in *Anchitherium*, is an individual character. Although this tooth is typically brachyodont, cement is deposited in the anterior and posterior valleys, but apparently not in the median valley or the outer or inner sides of the crown.

The third and fourth premolars differ from the second chiefly in matters of detail. The proto- and tritocones are of more nearly equal size and shape, though the former still exceeds the latter in size; it is somewhat concave on the external face and the median rib is obsolete. The posterior crest is angulate and sends forward a process which nearly reaches the deuterocone; its front margin, especially on $\underline{p.4}$, is much more markedly crenulate than in $\underline{p.2}$.

The molars decrease in size from the first to the third; their construction closely agrees with that of the premolars, but the external cusps (para- and metacones) are of nearly equal size and less concave than the corresponding elements of the premolars. The conules, especially the anterior, are somewhat more separated from the inner cusps. The posterior transverse crest is confluent with the outer wall, but the anterior is not.

As compared with the upper molars of the large European *Anchitherium*, *A. aurelianense*, those of *Desmatippus* differ in the following respects: (1) The presence of cement in the valleys; (2) the great widening of the transverse crests, especially of the posterior ones; (3) the much greater distinctness of the conules, which in the European species are very obscurely marked; (4) the greater flatness of the external cusps.

B. Lower Jaw. The first premolar has been lost from the specimen. The second differs considerably from the others in the shape of the anterior half of the crown; this portion of the tooth is flattened on the outer side and tapers anteriorly, giving it a wedge-like shape, when viewed from above. In consequence of this arrangement, the protoconid is triangular in section, the crests to the para- and deuteroconids respectively straight instead of curved, and the external valley is wider and of a different shape from that of the other premolars; the paraconid is larger and the posterior pillar smaller. Seen from the outside, this tooth appears to have a very similar construction to the $\overline{\mathrm{p.}\,2}$ of *Mesohippus*, but in a crown view the following differences are to be observed: (1) The proto- and paraconids are connected by a crest; (2) the anterior internal valley is very much better developed; (3) an anterior pillar is formed behind the deuteroconid, though both of these elements are much smaller than in the other premolars. In *Anchitherium aurelianense* the development of this tooth has proceeded farther than in *Desmatippus*, but in a somewhat different and peculiar way, the paraconid being greatly enlarged, comparable to the very large anterior buttress of the corresponding upper tooth.

The third and fourth premolars are molariform. The paraconid is much reduced and not distinguishable as a separate element from the anterior crest; the deuteroconid and anterior pillar are enlarged and of nearly equal size, and though much less distinctly separated from each other than in *Protohippus*, they are sufficiently enlarged to narrow the entrances to the internal valleys, which expand on the external side of them; the posterior pillar is fairly well developed and, when moderately worn, becomes confluent with the tetartoconid. The latter cusp is simple and does not send forward a crest such as is found in *Protohippus*.

The molars, as in the upper jaw, decrease in size, especially in breadth, posteriorly, $\overline{\mathrm{m.}\,3}$ being conspicuously narrower than $\overline{\mathrm{m.}\,1}$ and, but for its talon, shorter as well. In construction they differ but slightly from the premolars. On $\overline{\mathrm{m.}\,1}$ the posterior pillar is rather smaller than on $\overline{\mathrm{p.}\,4}$, and on $\overline{\mathrm{m.}\,2}$ it appears to be wanting, but $\overline{\mathrm{m.}\,3}$ shows it enlarged and developed into a distinct heel. None of the lower teeth in the type specimen display any indubitable traces of cement; other isolated teeth, however, which I think should be referred to the same genus, if not the same species, have a very thin coating of this substance.

Measurements.

	M.
Upper molar-premolar series, length	.117
Upper premolar series, length	.068
Upper first premolar, length	.014
Upper first premolar, width	.009
Upper second premolar, length	.022
Upper second premolar, width	.019
Upper third premolar, length	.019
Upper third premolar, width	.020
Upper fourth premolar, length	.019
Upper fourth premolar, width	.020
Upper molar series, length	.049
Upper first molar, length	.018
Upper first molar, width	.020
Upper second molar, length	.016
Upper second molar, width	.018
Upper third molar, length	?.014
Upper third molar, width	?.017
Lower molar-premolar series, length	?.119
Lower premolar series, length	?.066
Lower second premolar, length	.019
Lower second premolar, width	.008
Lower third premolar, length	.0185
Lower third premolar, width	.010
Lower fourth premolar, length	.017
Lower fourth premolar, width	.011
Lower molar series, length	.053
Lower first molar, length	.018
Lower first molar, width	.010
Lower second molar, length	.016
Lower second molar, width	.009
Lower third molar, length	.018
Lower third molar, width	.007
Depth of mandible below $\overline{\text{m. 1}}$	?.032
Depth of mandible below $\overline{\text{m. 3}}$	.047
Height of condyle	.103
Breadth of angle to $\overline{\text{m. 3}}$	.068

The horizontal ramus of the mandible is, for the most part, slender and shallow, especially towards the symphysis; but as the inferior border is nearly straight, and the line of molars rises rapidly posteriorly, the jaw becomes quite deep beneath $\overline{\text{m. 3}}$. The ascending ramus is high and the condyle is placed much above the level of the molars. The angle is rounded and not prominent. The anterior border of the ascending ramus is almost straight, broad and slightly grooved, the linea obliqua externa being better developed than in the horse, but less so than in the more ancient genera. My attention was called to this interesting transitional character by my assistant, Mr. Graham, and on further examination I find it to be frequently the case in other phyla, that the breadth of this border and the depth of the groove diminish in the more modernized forms.

The radius has a slender, flattened shaft, which expands distally and is also much thickened antero-posteriorly, so as to be of trihedral section. In this respect, *Desmatippus* resembles the less advanced genera and differs in a marked way from *Protohippus* and the later forms. The distal thickening is entirely on the anterior face, the posterior side remaining flat or even slightly concave. The distal ends of the radius and ulna are firmly coössified for a length of about two inches; above this, the shaft of the radius has upon its postero-external edge a shallow and narrow groove for the shaft of the ulna, which was obviously very slender, though probably not interrupted. The carpal surfaces of the forearm bones are too much mutilated for description.

Of the metacarpals, the third is preserved entire and also portions of the second. The former is remarkable for its slenderness and length, in which latter respect it considerably exceeds that of *Protohippus sejunctus*. Unfortunately, the proximal articular surfaces are so much broken that they cannot be made out satisfactorily. The distal end exhibits some important features which are intermediate between the more ancient and the later genera. As in the former, the shaft is expanded transversely just above the trochlea, which is narrower, while in *Equus* the trochlea is wider than any portion of the shaft. As compared with the earlier forms, the trochlea is higher and the carina, which in all preceding genera is confined to the palmar side, is in *Desmatippus* continued over the entire anterior face of the articular surface; very faintly, it is true, and yet unmistakably. This genus is therefore the first, at least in the direct line of descent, in which this characteristic equine feature appears.

The character of the phalanges will be best explained after quoting Kowalevsky's comparison between those of *Anchitherium* and *Equus*: "Par la forme des phalanges l'Anchitherium diffère complètement du cheval et de l'hipparion; il lui manque ce rétrécissement si considérable qui est charactéristique pour la prémière phalange des équidés; les phalanges du Daw qui ont 69 mm. de long. présentent au milieu une largeur transverse de 25 mm., tandis que les phalanges de l'Anchitherium qui n'ont que 35 mm. de longueur, c'est-à-dire la moitié, présentent au milieu une largeur transverse plus considérable, 26 mm." (No. 20, p. 66).

In *Desmatippus* the proximal phalanx of the median digit has already attained proportions which closely approximate those seen in *Equus*. The relative breadth of the proximal and distal ends is almost the same as in the horse, but the contraction of the bone in the middle is less marked. The groove for the metacarpal carina is deep near the palmar side; dorsally it becomes very faint, but is continued across the entire proximal surface and very slightly notches the anterior margin. On the palmar side of the phalanx the triangular roughened area for the attachment of the inferior sesamoid ligament, which in the horse descends nearly to the distal trochlea, is in *Desmatippus* very much smaller and confined to the proximal portion of the bone. The distal articular surface is less convex than in the horse, and is less reflected upon the dorsal and palmar sides; upon the latter side its margin is interrupted by a notch, which, however, is not so long or so deep as in the modern genus. The second phalanx is longer and more slender proportionately than in the horse, and is also more depressed and flattened than in that animal; the proximal articular surface is less concave, its median ridge less pronounced, and the tubercles for the attachment of the lateral interphalangeal ligaments are but slightly developed. The distal articular surface is not reflected so far upon the dorsal side as in *Equus*, though on the plantar side it rises as high relatively and the surface for the so-called navicular sesamoid is well marked. The ungual phalanx is only partially preserved, but enough remains to show that it is more equine in character than the long, depressed and flattened ungual of *Anchitherium aurelianense.* The line of the dorsal surface descends more steeply than in that species and the front margin of the proximal surface is elevated in the median line to form a slightly recurved, hook-shaped process, which, though much less prominent than in the horse, is much more so than in *A. aurelianense.*

The lateral digits, so far as can be judged from the fragmentary remains, were still fairly developed, and though much more reduced than in *Miohippus*, appear to be somewhat less so than in *Protohippus*. The distal trochlea of the metacarpal is less developed in proportion to the breadth of the shaft than in the John Day forms.

Measurements.

	M.
Metacarpal iii, length	.185
Metacarpal iii, width of proximal end	.020
Metacarpal iii, width of distal end	.018
Metacarpal ii, width of distal end	.009
Metacarpal ii, depth of distal end	.015
First phalanx iii digit, length	.050
First phalanx iii digit, width of proximal end	.024
First phalanx iii digit, width of distal end	.020
Second phalanx iii digit, length	.020
Second phalanx iii digit, width of proximal end	.024
Second phalanx iii digit, width of distal end	.021
Third phalanx iii digit, width of proximal facet	.022

A fragment of the pes accompanies the type specimen, which, however, displays no features of especial interest, as the bones are not sufficiently well preserved to show the minor changes in the articulations, which are so important in the equine series. As in the American genera of this series, the ento- and mesocuneiforms are coössified, not as in the European species of *Anchitherium*, the ecto- and mesocuneiforms. The internal cuneiform is very large, and forming nearly a right angle with the median, extends beneath the entire plantar border of the navicular to the cuboid. The ectocuneiform is higher vertically, in proportion to its breadth, than in *Protohippus*. The proximal portion of the median metatarsal is rather slender and rounded; that of the laterals is surprisingly large antero-posteriorly, but in part, at least, this is due to crushing. The shaft of the laterals rapidly tapers and becomes very slender. The median metatarsal appears to have a slight contact with the mesocuneiform, but the specimen is too imperfect to determine this point with certainty.

A second specimen, consisting of the tarsus and portions of the metatarsus, should probably be referred to this genus, though possibly representing a different species. It differs from the fragmentary pes belonging to the type specimen in only one particular, viz., in the much narrower proximal end of mt. ii. Part of this difference is no doubt due to the crushing to which the type specimen has been subjected, but not all of it, and the remainder may be referred to either individual or specific variation. Compared with the tarsus of *Protohippus sejunctus*, which Prof. Cope has kindly lent me for the purpose, some not unimportant divergences may be observed.

In size and general appearance the two specimens closely coincide; the differences are in matters of minute detail and are especially to be found in the relative development of the various facets. On the calcaneum attributed to *Desmatippus* the additional facet which runs distally from the ectal astragalar facet is somewhat longer than in *Protohippus*, but is not so clearly demarcated from the main facet. As in the latter, the ectal astragalar facet is in contact with that on the sustentaculum, but this latter surface is considerably broader and more nearly perpendicular to the long axis of the bone. The cuboidal surface is shorter, less distinctly divided into two parts, and at the plantar end less incurved, and is thus separated by a wider interval from the sustentacular facet.

The astragalus displays corresponding differences. The notch for the ectal calcaneal facet is wider and its distal continuation longer; from the latter the inferior border rises abruptly and terminates, as in *Equus*, in the beak formed by the sudden termination of the external astragalar condyle. In *Protohippus sejunctus* there is no such beak, but the outer condyle curves gently and without interruption into the external plantar border and the accessory calcaneal facet. Whether this is true of all species of the genus, I cannot at present determine. Another difference from the astragalus of *Protohippus* is found in the more abrupt truncation of the proximal end of the outer condyle, which thus exposes upon the calcaneum a larger surface for the fibula. As in the corresponding facet of the calcaneum, the sustentacular surface is broader. The navicular surface descends less upon the external side and is separated by a less pronounced angle from the cuboidal facet, which is less extended. The sulcus which invades the navicular surface in both genera is much less conspicuous than in *Equus*.

The proximal surface of the cuboid is very similar in the two specimens, except that in *Protohippus* the posterior extension of the calcaneal facet is somewhat longer and more recurved towards the tibial side. The distal end, on the other hand, is quite different in the two. In *Protohippus* the facet for metatarsal iv is distinctly larger, and that for mt. iii less oblique and more distal in position, than in *Desmatippus;* in the latter the surface for mt. iii is rather lateral than distal, which is an ancient character.

The navicular is quite different from that of *Protohippus;* it has a notably greater vertical height and its antero-external angle is much more extended across the face of the cuboid, though far less so than in the horse. Both specimens differ from the latter in the broader posterior portion of the navicular, the relatively greater fore-and-aft diameter of the astragalar surface and in the much less conspicuous development of the beak-like plantar extension. The sulcus on the astragalar facet is also much less marked.

The enlarged ectocuneiform is very much alike in the two Loup Fork genera. Both differ from *Equus* in the more rounded and less extended posterior beak; the articular surface of mt. iii on this extension is continuous with the anterior one, being interrupted by a sulcus on the external side, not, as in *Equus*, isolated completely.

The coalesced meso- and entocuneiforms are much larger in *Desmatippus* and extend across to the cuboid, with which the internal element is in contact, while in *Protohippus* they are widely separated and the entocuneiform is much more reduced than in the horse. Both specimens display a minute facet for mt. iii on the middle cuneiform, but the surface for mt. iv is almost confined to this bone and extends but slightly to the internal one, while in the horse it does so largely.

In the metatarsals the differences are slight, so far as the materials permit a comparison. The cuboidal facet on mt. iii is more oblique and the head of mt. ii is less reduced in *Desmatippus.* Compared with *Equus*, more important divergences may be noted; the cuboidal facet of mt. iii is, in the older genus, much smaller and less proximal in position, and that for the mesocuneiform is also smaller; the posterior surface for the ectocuneiform is much less developed and less completely separated from the anterior portion by the transverse sulcus. On mt. ii the surface for the entocuneiform is much less conspicuous.

The type of the genus was found by Mr. Benet.

The Systematic Position of Desmatippus.

Morphologically, there can be no doubt that this genus stands exactly intermediate between *Miohippus* of the John Day and *Protohippus* of the Loup Fork, and fills up the gap which has hitherto existed between those genera. This intermediate position is especially clear in the structure of the teeth. *Desmatippus* shares with *Miohippus* the short-crowned molars, and with *Protohippus* the presence of cement and the confluence of the posterior transverse crest with the outer wall in the upper teeth, and in the lower teeth the extension of the inner cusps and narrowing of the entrances to the internal valleys, though these features are less conspicuous. From these molars to those of the relatively short-crowned species of *Protohippus* the transition is an easy one. The same intermediate character is shown in the limbs and feet, so far as they are known, save only the greater length and slenderness of the metapodials, as compared with those of the more differentiated genus. These are, however, but specific, as distinguished from generic, characters and have but little importance.

An apparently strong objection to the position which I have assigned to this new equine genus may be drawn from the stratigraphical fact that it has as yet been found only in association with *Protohippus*. But, as we have already seen, there is a marked break between the faunas of the lower Deep River beds (*i. e.*, upper John Day) and the upper beds of the same region (*i. e.*, lower Loup Fork). With a few possible exceptions, no species of mammal is common to the two horizons and the great majority of the genera are different also. This abrupt change points with great probability to a hiatus between the formations, and in this case we may well believe that *Desmatippus* originated during the unrecorded period, and, after having given rise to *Protohippus*, persisted into the Loup Fork, just as *Miohippus* has done. Were the John Day beds unknown, we should have precisely the same difficulty with regard to the latter genus. Should this supposed unconformity prove not to exist, we must then assume that the later fauna was developed in some other part of the continent and reached the Montana valley by a migration. This assumption would dispose of the difficulty equally well.

So many cases of the apparent conflict between stratigraphical and morphological facts have been removed by further investigation, that we may confidently expect the same of this.

PROTOHIPPUS Leidy.

Proc. Acad. Nat. Sci., Philadelphia, 1858, p. 26.

PROTOHIPPUS SEJUNCTUS Cope.

Bull. U. S. Geol. and Geogr. Surv., No. 1, 1874, p. 13.

This specimen was found by Prof. Cope's collector in the Deep River beds, and is represented in our collection by a number of teeth and limb bones, which add nothing to our knowledge of the species.

PROTOHIPPUS sp.

(Pl. II, Fig. 17.)

A smaller species than *P. sejunctus* is indicated by several specimens, none of which, unfortunately, are associated with teeth, so that we cannot tell whether they should be referred to any of the species from the typical Loup Fork horizons. The most characteristic specimen consists of the distal part of the ulno-radius, the proximal row of carpals and the heads of mcs. iii and iv. The radius may at once be distinguished from that of *Desmatippus* by the more equine shape of the distal portion, where the shaft is more flattened and less trihedral, with relatively greater transverse and less antero-posterior diameter. The ulna, the distal end of which, at least, is coössified with the radius, is more reduced than in *Desmatippus*, and, judging from the marks on the shaft of the radius, the shaft was interrupted.

Comparing the carpus of this specimen with that of *Miohippus*, we may observe important advances and modernizations. In the scaphoid, the width and antero-posterior depth are relatively increased; the proximal articular surface is reflected upon the palmar side, where it forms a small facet, articulating with a corresponding one on the radius in extreme flexion. That the trapezium was present is shown by a small facet on the scaphoid. The lunar has increased in dorso-palmar diameter and the posterior knob, which in *Miohippus* is a mere knob and does not carry any of the magnum facet, is very much more prominent and the distal facet is extended upon it, so that the latter has gained much in extent from before backward. The cuneiform is like that of *Equus* in almost every respect, except that it is more compressed and less massive, the upper pisiform facet is somewhat larger and the lower somewhat smaller. The pisiform is decidedly more equine than that of *Miohippus*, both in its much greater vertical height and in the separation of the two cuneiform facets, which in the latter are still connected. It has not attained, however, the full vertical diameter seen in the horse.

The median metacarpal is much expanded, and especially the palmar portion is much wider than in *Miohippus.* The magnum surface is entire, and that for the unciform is larger and more oblique. This latter facet is divided into two parts by a sulcus, which hardly more than emarginates that for the magnum. It seems probable that a rudiment of the fifth metacarpal was preserved, for which a facet shows on the head of mc. iv.

Measurements.

	M.
Breadth of radius and ulna, distal end	.035
Depth of radius, distal end	.018
Height of lunar	.015
Width of lunar, distal end	.012
Width of unciform facet	.004
Width of mc. iii, proximal end	.021
Depth of mc. iii, proximal end	.014

Found in the upper beds of Deep river by O. C. Mortson.

ANCHITHERIUM von Meyer.

Teeth brachyodont, without cement; upper molars and premolars with the posterior transverse crest confluent with the outer wall of the crown; conules so much reduced as to be scarcely distinguishable from the remainder of the crests; external crescents deeply concave and overhanging; in the lower cheek teeth the anterior pillar is reduced, and on more or fewer of the teeth is wanting; posterior pillar also reduced; incisors, either the upper alone, or both upper and lower, with shallow pits.

Whether the coössification of the meso- and entocuneiforms is a generic character remains to be seen.

ANCHITHERIUM EQUINUM Scott.

Amer. Naturalist, 1893, p. 661.

This animal may be at once distinguished from all other American horses by the generic characters given above, since this is the only known American species of *Anchitherium* in the restricted sense in which I have used that term. From the best-known European species, *A. aurelianense*, it differs in the following respects: (1) Larger size of the teeth in proportion to the skeleton; (2) absence of enamel invaginations in the lower incisors; (3) smaller size of the antero-external buttress on $\underline{\text{p. 2}}$; (4) the transverse crests of the upper molars and premolars are less sinuous; (5) $\overline{\text{p. 2}}$ has the anterior half of the crown flattened on the outside and no external valley; (6) the diastema between the lower canine and $\overline{\text{p. 1}}$ is relatively shorter and the symphysis much narrower; (7) the proximal end of the humerus differs in details that will be explained in the full description; (8) the median digit is more enlarged and its ungual phalanx shorter and more rounded, but also flatter and more depressed.

The type specimen of the species consists of a fragmentary skull (with the dentition almost complete), several vertebræ from different regions, the fore limb (lacking the scapula) and the pelvis. Several other fragmentary specimens are referable to the same species.

Dentition. A. Upper Jaw (Pl. III, Fig. 21). The incisors decrease regularly in their dimensions from the first to the third; they have very short, but broad and thick crowns, and already present a decidedly horselike appearance; the cingulum is elevated, and thus between this structure and the front margin of the crown a pit is formed. In spite of the fact that this genus, as will be shown in the sequel, is almost certainly not in the direct line of equine descent, we may conclude with great probability that these teeth explain the genesis of the invagination in the incisors of the recent horses and that, in the latter, the hind wall of the pit is to be regarded as a greatly enlarged cingulum. The canine has been lost, but the alveolus shows that it was rather small and separated from the incisors by a short diastema and from $\underline{p.1}$ by a longer one.

The first premolar, as in the European species, is relatively larger than in the more ancient genera of the phylum, *e. g.*, *Mesohippus.* On the outer side it is convex and so obscurely divided that a tritocone can hardly be said to be present; the deuterocone is a long, low ridge, ending posteriorly in a cone, which probably represents the tetartocone in an incipient stage. As in the horses generally, the second premolar is the longest tooth in the series. This elongation from before backward is due to the enlargement of the antero-external buttress, or protostyle, which, however, is less extreme than in *A. aurelianense;* it is separated from the protocone by a fold or ridge of enamel. This tooth differs further from the succeeding ones in the greater narrowness of its anterior portion, which produces a shortening of the anterior transverse crest, and the posterior is slightly separated from the external wall. The third and fourth premolars differ comparatively little from the corresponding teeth in the European species; the external crescents are not quite so deeply concave, the outer cingulum is somewhat more, and the inner somewhat less developed. The posterior pillar is large and on wear becomes connected with the posterior crest, so that the hinder valley is completely enclosed.

The upper molars are likewise very similar to those of *A. aurelianense,* except that the transverse crests are somewhat straighter and the conules even more reduced. The third molar is much the smallest of the series and differs quite markedly from the corresponding tooth of the European species. The posterior crest is not curved, but angulate, running inward at a right angle from the external wall and then turning at an obtuse angle towards the hypocone; somewhat external to the latter it sends off a spur which connects with the posterior cingulum. The posterior valley is thus completely enclosed, even before the tooth is worn down. There is, properly speaking, no posterior pillar, its place being taken by a triangular depression, which is enclosed between the hypocone, the spur from the posterior crest already mentioned, and the elevated cingulum.

B. Lower Jaw (Pl. III, Fig. 25). As in the upper series, the incisors diminish from the median to the lateral. Seen from the front, they are much like the upper teeth, but differ from them in having no well-marked internal cingulum and consequently no invagination such as occurs in the European form. The canine is rather small, possibly a sexual character, and follows the incisors with hardly an interval.

The first premolar is smaller, especially transversely, than the corresponding upper tooth and is very simply constructed. It is narrow and compressed, and consists of a low principal cusp (protoconid) with obscurely marked anterior and posterior basal cusps (para- and metaconids). The second premolar differs considerably from that of *A. aurelianense.* The anterior half of the crown is flattened on the outside; the paraconid is less enlarged and is not separated from the protoconid by an external valley. This tooth appears to have neither anterior nor posterior pillars; a strong external cingulum is present on the hinder half but not on the front. The third and fourth premolars do not differ in any important respect from those of the European form; the anterior pillar appears to be fairly well developed, but the posterior is reduced to very small proportions.

The molars also resemble those of the European species; $\overline{\text{m. 1}}$ appears to have a small anterior and a still smaller posterior pillar; in the hinder valley is a small accessory tubercle, but this is, no doubt, an individual variation. The second and third molars have no anterior pillars, the metaconid simply extending across the end of the crest which runs inward from the hypoconid. This crest is not continuous with the metaconid, but is separated from it by a shallow groove. I find exactly the same condition of $\overline{\text{m. 2}}$ and $\overline{\text{m. 3}}$ in an almost unworn specimen of *A. aurelianense* from Sansan, but in the large animals from Steinheim, which have been figured by Fraas (No. 12, Pl. VI, Fig. 2), all the molars, except $\overline{\text{m. 3}}$, have small anterior pillars, and the posterior pillar is exceedingly reduced on $\overline{\text{m. 1}}$ and absent on $\overline{\text{m. 2}}$. In *A. equinum,* $\overline{\text{m. 2}}$ has a much reduced posterior pillar and $\overline{\text{m. 3}}$ a large heel. All of the lower teeth from $\overline{\text{p. 3}}$ to $\overline{\text{m. 3}}$ have a strongly marked external cingulum, but none on the inner side of the crown.

The specimen does not enable us to say much with reference to the character of the skull (Pl. III, Fig. 23). So far as can be judged from the portions preserved, it very much resembles that of the White River *Mesohippus* and displays comparatively little modernization. The face has become somewhat lengthened by the recession of the orbits, but not so much as in the John Day *Miohippus præstans;* the anterior rim is over $\underline{\text{m. 2}}$, while in *Mesohippus* it is over $\underline{\text{m. 1}}$. The infraorbital foramen has accompanied this recession, so that its position with reference to the orbit remains the same as before. In this species it is above $\underline{\text{p. 4}}$, in *Mesohippus* over $\underline{\text{p. 3}}$. The orbit remains very low down in the face, or rather has descended still lower relatively, owing to the development of large frontal sinuses, while the molars remaining very short crowned give no occasion for elevating the orbits. Consequently, the supraorbital region has a much greater vertical depth than in the White River genus. The orbit is still open behind, but the postorbital process is somewhat longer and more recurved. The supraorbital foramen of *Equus* is, as in the older genus, represented by a deep notch, but the spine is more prominent and nearer to the postorbital process, which appears to be a step towards converting the notch into a foramen. Not enough of the lachrymal is preserved to determine whether a lachrymal pit is present or not. The cranium is much more elevated above the level of the face than in *Mesohippus*, and this results in giving the zygomatic arch a much more abrupt descent downward and forward. The zygomatic process of the squamosal is rather high vertically, but very thin and compressed. The glenoid cavity has the characteristic equine appearance even more decidedly marked than in the more ancient form and its outer portion is raised into quite a prominent tubercle. The postglenoid process is very largely developed and is much longer, heavier and more rugose than in *Equus*. The elevation of the cranium, unaccompanied by a corresponding rise in the position of the orbits, brings about a curious combination of primitive and advanced characters, a combination which may, for the most part, be referred to the elevation of the cranium together with the retention of the primitive brachyodont dentition. The premaxillary region is decidedly more equine than in *Mesohippus*. Corresponding to the increase in the relative dimensions of the incisors, the horizontal portion of the premaxillaries is more largely developed, especially in the vertical direction. The symphysis is quite high and ends above in an obtuse spine, and the ascending ramus makes a more decided angle with the horizontal part. Compared with the premaxillary of the horse, the chief difference to be observed is the rapid descent of the upper margin of the bone at a point above the diastema between the incisors and canine, so that at this point the vertical height is much less than elsewhere. This feature does not occur in either *Equus* or *Mesohippus*. There is no such constriction of the muzzle behind the canine as is seen in the latter genus.

The mandible has a long, stout and rather deep horizontal ramus, which tapers less anteriorly than in the White River form. The symphyseal portion is long and procumbent, quite sharply constricted at the diastema and expanding again to form the semicircular alveolus in which the incisors and canines are inserted. In this portion of the mandible, this species resembles *Mesohippus* more than *Equus;* it differs from both in the rapid rise of the inferior border towards the chin. The ascending ramus is also intermediate in character between the same genera. With the former it agrees in the shape of the angle, which is set off from the posterior border by a notch some distance below the condyle; in the broad anterior border of the ascending ramus, with its deep groove for the buccinator and maxillo-labial muscles and prominent linea obliqua externa. The latter gradually approximates the linea interna and unites with it to form the anterior border of the coronoid. On the other hand, the ascending ramus is decidedly higher than in *Mesohippus* and the condyle is greatly elevated above the level of the molars, in correlation with the raising of the base of the cranium already referred to. This elevation is, however, much less in proportionate amount than occurs in the horse, where the vertical height of the ascending ramus, measured to the condyle, is more than half the length of the horizontal ramus (about 5:8). The coronoid is much better developed than in either the lower Miocene or the recent genus; it is very high, erect and compressed; the free end is somewhat flattened obliquely and recurved, and the posterior border is nearly straight. The coronoid notch is narrower and deeper than in the White River species, and the condyle more extended transversely, especially towards the external side.

Measurements.

	M.
Mandible, length	.305
Mandible, height of condyle	.126
Mandible, height of coronoid from sigmoid notch	.052
Mandible, depth at $\overline{\text{p. 1}}$	.030
Mandible, depth at $\overline{\text{m. 3}}$	.052
Lower median incisor, width	.010
Lower second incisor, width	.009
Lower third incisor, width	.007
Lower molar-premolar series, length	.148
Lower premolar series, length	.078
Lower first premolar, length	.013
Lower first premolar, width	.006
Lower second premolar, length	.021
Lower second premolar, width	.009
Lower third premolar, length	.022
Lower third premolar, width	.013

Lower fourth premolar, length	.022
Lower fourth premolar, width	.014
Lower molar series, length	.070
Lower first molar, length	.023
Lower first molar, width	.014
Lower second molar, length	.022
Lower second molar, width	.012
Lower third molar, length	.025
Lower third molar, width	.010
Upper median incisor, width	.011
Upper second incisor, width	.010
Upper third incisor, width	.009
Upper molar-premolar series, length	.147
Upper premolar series, length	.083
Upper first premolar, length	.014
Upper first premolar, width	.011
Upper second premolar, length	.025
Upper second premolar, width	.025
Upper third premolar, length	.025
Upper third premolar, width	.027
Upper fourth premolar, length	.025
Upper fourth premolar, width	.026
Upper molar series, length	.068
Upper first molar, length	.025
Upper first molar, width	.028
Upper second molar, length	.025
Upper second molar, width	.027
Upper third molar, length	.021
Upper third molar, width	.022

The discrepancy between the measurements of individual teeth and the totals of the molar and premolar series is due to overlapping.

I know of no materials which would render possible a detailed comparison of the skull structure of this species with that of *A. aurelianense*, the European specimens which have been figured being extremely imperfect in this respect. Some points of interest may, however, be determined. In the European species the orbit occupies the same position as in the American, but the infraorbital foramen is slightly farther forward. The zygomatic arch appears to have a less abrupt descent anteriorly and the base of the cranium to be less elevated. The premaxillaries are very different in appearance; the alveolar portion is shallower and the symphysis shorter and devoid of the conical elevation at the top; it is also of more uniform depth and its upper margin does not show the abrupt descent above the diastema which is so characteristic of *A. equinum*. The horizontal ramus of the mandible is deeper and the rise of the inferior margin at the symphyseal portion and the chin much more decided and abrupt. The ascending ramus appears to be shorter and the condyle is less elevated above the level of the molars.

The Vertebral Column (Pl. II, Figs. 18–20). The atlas is elongate antero-posteriorly in proportion to its transverse width; the anterior cotyli for the occipital condyles are very deeply concave, but somewhat narrow and depressed from above downward. Their lateral anterior margins are notched quite deeply and the inferior portion is flared, so as to present forward instead of upward. Below, the cotyli are separated only by a narrow and shallow groove, but superiorly they are kept wide asunder by a very deep emargination of the neural arch, which is much more pronounced than in *A. aurelianense*, *Mesohippus*, or *Equus*. The neural spine is indicated by a faintly marked ridge and is enclosed in a lyrate area formed by the surface of attachment for the small posterior straight muscles of the head; this area is more distinctly shown than in any other equine which I have examined. The inferior arch is strongly convex and is constricted in the middle to form the deep inferior fossæ; the hypapophysis is prominent and forms a large rugose tubercle. The transverse processes are broken away, but enough remains to show that the atlanteo-diapophysial notch has not been converted into a foramen; this notch is continued backward as a groove into the foramen for the first spinal nerve. The line of attachment of the transverse process pursues a straight course downward and backward and does not describe the slight sigmoid curve which is seen in *Mesohippus*. The foramen of the vertebrarterial canal pierces the process on the dorsal side. The articular surfaces for the axis present less directly backward than in *A. aurelianense;* in shape, these surfaces are triangular, with the long diameter placed vertically; the facets are reflected forward upon the inner walls of the neural canal and are connected below by the broad surface for the inferior face of the odontoid process.

Compared with the atlas of the European species, the chief difference to be observed is the very much greater depth of the notch which separates the dorsal margins of the anterior cotyli.

The axis, so far as it is preserved, closely resembles that of *A. aurelianense;* it has a very much depressed and strongly keeled centrum, which expands anteriorly to give space for the atlanteal facets. The latter are higher and narrower and rise more upon the sides of the neural canal than in the horse. The odontoid process is longer than in the European form and is pointed at the end, as in that species, instead of being truncate, as in the horse. The articular surface on the ventral side of the process is continuous with those on the centrum. The spout-like shape of the odontoid is even better marked than in the existing genus, owing to the greater elevation of the margins. These raised margins do not, however, extend for the full length of the process, but allow the tip to project freely beyond them, which gives to the ventral aspect of the odontoid a trifid appearance. This feature is more emphasized in the European form than in the American.

Other cervical vertebræ accompany the specimen, but unfortunately they are so badly damaged that little can be learned from them beyond the fact of their strongly opisthocœlous centra and the generally equine nature of their processes.

The posterior thoracic and lumbar vertebræ are likewise opisthocœlous and have long, heavily built centra, with spines compressed and inclining forward; the zygapophyses are quite flat and show the equine character of cylindrical, interlocking processes only in very moderate degree; it is somewhat more distinctly displayed in the lumbar region.

Fore Limb (Pl. II, Figs. 21, 22; Pl. III, Figs. 26–28; Pl. IV, Figs. 30, 31). The humerus is of the same size as that of *A. aurelianense*, but differs from it in many details of construction, in which it approaches the horse more closely than does that species. As in the latter, the head projects much more strongly backward than in the modern type, but resembles the structure of *Equus* more than that of *A. aurelianense* in its greater flatness. The greatest difference, however, between the two species of *Anchitherium*, in regard to the humerus, consists in the character of the tuberosities. According to Kowalevsky, the structure of the proximal end in the European form is intermediate in character between the tapir and the horse; the external tuberosity is almost as large as in the former and the internal is also very similar to what we find in that animal; but in the bicipital groove is a small, rounded eminence, the beginning of the bicipital tubercle which reaches such prominence in *Equus*. In *A. equinum* the tuberosities are more as in the latter genus; the external one is much reduced, but the summit of the anterior portion rises higher than in the recent form, while the crest to which the subspinatus muscle is attached has a greater antero-posterior extent but is less elevated. The outer bicipital groove is much shallower than in the horse and the bicipital tubercle, though broader, is much less prominent and clearly defined. The external and bicipital tuberosities form a broad crest, which rises much higher above the level of the head than in the existing genus and entirely different from the corresponding structure in *A. aurelianense*. The shaft is massive, broad, and flattened proximally, becoming round in the middle and flattening again distally. The deltoid hook and ridge are well developed, though less so than in the horse, and the hook is placed higher up on the shaft than in the European species. The distal end is much more equine in appearance than in the latter, though as in it the trochlea projects more anteriorly than in the horse, which, in connection with the stronger posterior projection of the head, gives to the whole bone a much more decided sigmoid curvature, when viewed from the side, than in the recent type. The intertrochlear ridge is better developed than in the animals from Sansan and the intertrochlear furrow not so deep; the borders of the anconeal fossa are much more prominent and directed more obliquely towards the inner side and the inner margin is nearly vertical and parallel to the long axis of the shaft, as in the horse. The supinator ridge is less prominent than in the latter. Altogether, the humerus of *A. equinum*, both in its proportions and in the details of its construction, approximates the modern type much more decidedly than does that of the European species.

The ulna is quite different from that of the last-named species, in some respects being more equine and in others less so. The shaft is much reduced, but it is not interrupted and at no point is there any coössification between the ulna and radius, though doubtless this feature is subject to variation, as it is in *Mesohippus*. In order to make clear the differences between the two species of *Anchitherium*, with regard to the structure of the ulna, it will be best to give Kowalevsky's description of it in the French species, which is essentially as follows: The olecranon is much compressed and resembles in general that of the Palæotheria in the absence of that curvature towards the inner side which is characteristic of the horses. As in the latter, the sigmoid facet is not continuous, but is interrupted on the external border by a deep sulcus. The proximal radial facet is continuous, not interrupted in the middle. For the distal 40 mm. of its course the ulna is coössified with the radius, but only slightly so, for among thirty specimens which Kowalevsky examined there was but one in which the distal end of the ulna was still attached to the radius.

In *A. equinum* the olecranon has the inward curvature which is found in the horses, but not in so marked a degree, and the process rises more steeply and projects less decidedly backward; the sigmoid facet is not interrupted upon the external margin and especially in the distal portion the humeral surface is very much larger. The radial facets are of very unequal size, the external being much the larger, and the two are nearly but not quite separated by an emargination of the inferior border. The transverse width of the ulna, measured across the radial facets, is very much greater relatively than in the horse. The radio-ulnar arch is as considerable as in *A. aurelianense*, but distal to this the two bones are in contact throughout their entire length, as, according to Kowalevsky's figure, they are not in the European species. The distal portion of the bone is also very different from what we find in that species; the lower part of the shaft expands into quite a broad plate, which is received into a deep notch in the radius; beneath this, the shaft abruptly contracts, expanding again distally to form the carpal surface. The latter is also different from that of the European form, where it is triangular with its greatest diameter directed transversely, while in the American species, as in the horse, it is much deeper antero-posteriorly than broad transversely and projects behind the lunar facet of the radius. The external side displays no such tendinal sulcus as in the horse; the pisiform facet is narrower than in that animal but relatively higher.

The radius is, in many respects, more like that of the modern type than is the same bone in *A. aurelianense*, but still retains a number of primitive features. The proximal end is expanded transversely, though somewhat less so than in the horse, a difference which is partly due to the much smaller size of the tuberosity for the attachment of the external lateral humero-radial ligament. The bicipital tuberosity occupies very much the same position as in *Equus*, but is reflected somewhat more upon the internal face and the internal ligamentous process is more prominent. The humeral facets are very similar in the two genera, but the intertrochlear ridge is narrower in the extinct animal, and the deep sulcus which in the horse invades this ridge is, in *A. equinum*, represented by a small raised surface with roughened borders. The intertrochlear furrow is well marked, though less so than in *Equus*, and produces a shallower emargination of the anterior rim. The facet external to this groove is relatively broader than in the modern genus. The shaft is of very uniform dimensions throughout; it is slightly arched forward, broad, and antero-posteriorly compressed, and in general very similar to that of *Equus*, but is more slender and rounded, less expanded and more trihedral distally, where the inner face forms an angle with the anterior, instead of curving gently into it. This trihedral shape is found in all of the primitive equines and even persists in *Desmatippus*. The sulci for the extensor tendons are narrower and have less rugose and elevated margins than in *Equus*. The postero-external angle of the shaft forms, for most of its length, a roughened ridge, to which the ulna is closely applied, and just above the distal end is deeply notched in order to receive the expansion of the ulnar shaft already referred to. Beneath this notch the radius expands to its maximum distal breadth and then narrows again to the carpal surface. The latter is almost exactly as in *E. caballus*, the following being the only differences which can be observed: (1) The scaphoid facet is more concave in front and descends more abruptly behind; (2) the same facet narrows at the posterior projection behind the plane of the lunar surface, instead of being of nearly uniform width; (3) there is no facet for the lunar upon the ulnar side of this scaphoid projection; (4) the lunar facet is not reflected so far upon the posterior side of the bone.

From this description it will at once be evident that the radius of *A. equinum* approximates that of the modern forms very closely, and thus departs considerably from *A. aurelianense*, which displays this modernization in a less degree, as may be seen from the following points of difference: (1) In the European species the shaft is less broad and flat, more slender and rounded; (2) the bicipital tubercle is on the internal face; (3) the proximal end is less expanded; (4) the distal end is narrower and more distinctly trihedral; (5) the carpal surfaces have less antero-posterior extension, and, in particular, the scaphoid surface extends less behind the plane of the lunar. In this respect, the carpal facets of *A. aurelianense* resemble more those of *Equus asinus*, while *A. equinum* approximates *E. caballus*.

The Carpus (Pl. IV, Fig. 31). The proportions of the scaphoid are very similar to those seen in the horse, it being only slightly narrower and higher in relation to its depth fore and aft. The proximal surface, however, differs from the condition found in the modern genus in a way corresponding to what has already been described in the radius, viz., in the greater convexity of the anterior portion and narrowness in the palmar part. Distally, the differences are more important, as is seen in the much less relative size of the magnum facet and the narrower and more deeply concave surface for the trapezoid, as well as in the presence of a distinct facet for the trapezium, which is absent in the horse. The facets for the lunar are smaller and less projecting than in the latter. The scaphoid of the European species is almost precisely the counterpart of that of the American form; the antero-external angle is somewhat more elevated and the distal facets have a slightly different shape.

The lunar differs from that of *Equus* much more than does the scaphoid; it is both higher and narrower, and the proximal surface especially has smaller proportionate diameters, both transversely and antero-posteriorly. The radial facet differs in being quadrate rather than triangular; it is much less extended on the palmar side and lacks the additional facet on the posterior crest which occurs in the recent animal; in front, the descent towards the radial side is both greater and more abrupt; the lateral facets for the scaphoid and cuneiform are much less prominent, and hence the median constriction of the lunar, when viewed from the front, is not nearly so marked. Distally, we note that the unciform facet is wider and more oblique and that for the magnum is smaller in both dimensions; this is especially true of its posterior prolongation, the well-developed, knob-like process projecting considerably beyond it, as it does not in the horse. The lunar of the European species differs from that of the American principally in the greater breadth of the facet for the unciform and the less antero-posterior extent of that for the magnum.

The cuneiform has a much greater antero-posterior, as compared with its vertical diameter, than is the case in the horse; it is also narrower transversely and more compressed. The principal pisiform facet is much smaller and is not isolated, as in *Equus*, but is connected with the ulnar facet by a narrow articular surface. The distal facet for the unciform is more deeply concave in front. Kowalevsky does not figure this bone in the French specimens.

The pisiform is very different in shape from that of *Equus caballus* and is more like that of *E. burchelli*. Compared with the pisiform of the former species, it is very less broadened vertically, is more recurved at the free end, and there is a greater difference in vertical diameter between the proximal and distal ends. The principal cuneiform facet is sessile, not strongly projecting, and is connected by a narrow band with the upper facet. In *A. aurelianense* this connection is not found, and the cuneiform facet is very prominent, as in *Equus*, but, on the other hand, the free portion is even more slender and tapering than in the American species.

The trapezium is not preserved in the specimen, but its presence is demonstrated by the facets upon the scaphoid, trapezoid and second metacarpal.

The trapezoid is likewise very equine in character, but with some not unimportant differences of detail. The facet for the scaphoid is somewhat less strongly convex and continues posteriorly, without interruption, into the small surface for the trapezium. Distally, the divergences between the two genera are more marked. In *Equus*, behind the large surface for the second metacarpal, there is a facet for the posterior part of the head of mc. iii, and, at right angles with this, a surface for the magnum, the two together forming a conspicuous projection. In *A. equinum*, on the other hand, the trapezoid has no contact with mc. iii, and the posterior contact with the magnum is very limited and appears not to form a facet. In this species, also, the trapezoid is less completely concealed by the magnum when the carpus is seen from the front. On the ulnar side there are two well-developed facets for the magnum, which are separated by a narrower interval than in the horse. The trapezoid of the European species is unknown, but the facets on the adjoining bones show that it was very much as in the American form.

The magnum is, in general, extremely equine, but differs in many minor points from that of existing species. It is higher and narrower in the fossil; the proportions of the two proximal facets are about as in the horse, except that the posterior convexity, or head, is very much narrower. As in the existing species, this head is covered entirely by the lunar and has no contact with the scaphoid. On the radial side of the magnum are two facets for the trapezoid and a small oblique surface for mc. ii; the posterior trapezoid facet, which is so conspicuous in *Equus*, does not occur. On the ulnar side, the unciform facets are quite different from those of the horse. In the latter genus the two anterior unciform surfaces are close together and sometimes confluent, and the posterior facet occupies more than half the vertical diameter of the head. In *A. equinum* all three facets have a much smaller vertical extent and the two in front are widely separated; the superior one is narrower but extends much farther back upon the side of the head. On the distal surface several notable differences are to be observed. In the fossil, the anterior border describes a decidedly smaller arc of a circle and the middle line of the posterior prolongation is nearly coincident with the middle line of the bone, while in the horse the radial portion of the magnum has been much extended, which gives to the hinder prolongation a more unsymmetrical position; it is also very much broader and its hinder margin straighter and more oblique in direction, and forming angles with the lateral borders, instead of being connected with them by curves as in *A. equinum.* The magnum of *A. aurelianense* is altogether like that of the American species, except for the confluence of the two anterior unciform facets.

The unciform has, unfortunately, been lost from the manus of both sides, but there is no reason to doubt its resemblance to that of the European species in all important respects.

The Metacarpus. The second metacarpal has a head of more primitive form than in *Equus;* it is less extended antero-posteriorly in proportion to its breadth, and not only rises above the head of mc. iii, but slightly overlaps it, in order to reach the magnum. The two facets for mc. iii are distinctly, though not so widely, separated and the anterior facet is plane, not concave. As the head of mc. iii has a much smaller extension towards the radial side, mc. ii is less crowded backward and is more completely visible from the front. The surface for the trapezoid is less flattened, but remains slightly concave, and passes on the palmar side into a small facet for the trapezium, which is lost in the modern genus. The shaft is long, very much compressed laterally, but retaining a considerable antero-posterior depth; the same is true of the distal end, which measures almost as much from before backward as does the distal trochlea of the median metacarpal. The carina is but feebly developed and entirely confined to the palmar side of the trochlea. In the specimens of *A. aurelianense* from Sansan, which Kowalevsky has figured, mc. ii differs from that of *A. equinum* only in the following particulars: The proximal portion is triangular, not irregularly quadrate in shape; the facet for mc. iii is not divided into two parts; and the distal trochlea is more recurved. Fraas has, however, figured a specimen from Steinheim (No. 16, Pl. VI, Fig. 12) in which the lateral metacarpals are of proportionately enormous dorso-palmar extent, far more so than in the American form.

The third metacarpal differs in many important respects from that of *Equus;* the proximal end is much less expanded transversely, while its depth from before backward remains relatively less. Owing to this less expansion transversely, the anterior facet for mc. ii presents more laterally and less posteriorly. The unciform facet is single, but the deep sulcus, which in *Equus* divides it into two parts, is present in an incipient stage; this facet is still entirely lateral and but little oblique in position, while in the horse it has become altogether proximal. The facet for mc. ii is double, but that for mc. iv still remains single, though showing a tendency to divide into two parts. A striking difference between the two genera in regard to the head of the median metacarpal lies in the very much narrower posterior portion in the fossil. In the horse this region is extended beneath the unciform, on the one hand, and the trapezoid on the other, and is separated, on the ulnar side, by a deep sulcus from the anterior portion of the magnum facet. In *A. equinum* this posterior region does not touch the trapezoid, its contact with the unciform is lateral, and the sulcus which invades the magnum facet is only incipient. The shaft is of very uniform dimensions, contracting very little below the head, where it is of transversely oval section; for most of its length it retains much the same form and size, but towards the distal end it gradually widens and becomes more flattened. The distal trochlea is low and narrower than the shaft, which is broadened just above the trochlea by the tubercles for the attachment of the lateral ligaments. The carina is prominent upon the posterior surface but dies away upon the anterior. In *A. aurelianense* the specimens differ considerably in the character of the median metacarpal. In those from Sansan the bone is very much as in the American species, but the facet for mc. iv is double and the distal keel extends farther upon the anterior face. In the specimens from Steinheim the keel is entirely restricted to the palmar side, but the proximal end is quite modernized by the rounding of the anterior border of the magnum surface, the widening of the posterior extension of this facet, and the partial separation of the two by a sulcus from the ulnar side.

The fourth metacarpal has a narrow, slightly concave head for the unciform, and the posterior side displays a small facet for the proximal end of the rudimentary mc. v. The shaft is truncated obliquely for about an inch below the head and forms a roughened surface, to which the styliform rudiment was no doubt closely applied. The shaft and distal end of mc. iv are the counterparts of mc. ii. A rudiment of mc. v was also present in the European species.

The Phalanges (Pl. III, Figs. 27, 28; Pl. IV, Fig. 31). In the lateral digits the phalanges are different in many details from those of the French specimens of *A. aurelianense.* The proximal phalanx is shorter in proportion to that of the median digit, though of the same actual size, and relatively to the length of the metacarpals; beneath the proximal thickening the bone is more suddenly constricted and then thickens again slightly to form the distal trochlea. The lateral profile is thus very different from that of the French specimens and, seen from the front, it is much straighter and less arched outward than in Kowalevsky's figure. Gaudry, however, represents it more as in the American species (No. 13, Fig. 176). I may add here that the latter drawing shows a very much wider median metacarpal than in *A. equinum*, broader in proportion to its length than in *Protohippus* or *Hipparion.*

The second phalanx differs from that of the European species, especially in the very much greater development of the posterior "salient beak," which is formed by a prolongation of the external half of the proximal surface. This, together with the more marked median constriction, gives the side view of the second phalanx quite a different appearance in the two species.

The lateral unguals are still more different. In the Sansan specimens of *A. aurelianense* "this phalanx is very small; it has the shape of a right-angled triangle, of which the hypothenuse forms the postero-inferior border and the right angle is placed antero-superiorly. . . . . It does not differ appreciably from the same phalanx of *Hipparion*" (Kowalevsky, p. 69). In *A. equinum* the ungual is much larger in every dimension, especially in the length of the postero-inferior border; the so-called "basilar process" and "wing" are also better developed, and the outline is that of a spherical triangle, all of the borders being curved. In length this bone much exceeds either of the other phalanges and must have had distinctly more functional importance than in the typical forms of the European species. Fraas' figure of the lateral ungual from Steinheim shows a phalanx which is again different from both the French and American forms, though considerably nearer to the latter, as is shown by its elongation and extended "basilar process."

The phalanges of the median digit are likewise somewhat different from those of *A. aurelianense.* Kowalevsky's account of their form in this species has already been quoted in the description of *Desmatippus* and it is unnecessary to repeat it here. The dimensions of the proximal phalanx in *A. equinum* agree very well with the largest specimens of the French species from Sansan, as given by Kowalevsky, except for the greater antero-posterior depth of the proximal end. The groove for the carina of the metacarpal is less profound and not continued so far forward; the triangular roughened surface for the attachment of the sesamoid ligaments is somewhat more prolonged towards the distal end. The intercondylar notch which emarginates the distal trochlea on its palmar edge is much less conspicuous than in the European species or the modern horse.

The second phalanx is not preserved in the specimen.

The ungual phalanx is unmistakably equine in character and yet very different from the modern type. It also differs strongly from the usual form of ungual which occurs in *A. aurelianense*, though the latter species displays a considerable degree of variation in this regard. In the specimen figured by Kowalevsky the ungual is very long, depressed, and pointed towards the distal end, and yet with considerable dorso-palmar depth. Gaudry's figure of the same species exhibits a decidedly more modernized hoof, marked by the more rounded border of the palmar surface, the greater vertical depth and consequent steeper inclination of the anterior face; the proximal articular facet is much more nearly parallel to the plane of the palmar surface. A third type of ungual which has been referred to this species is shown in Fraas' figures of the large animal from Steinheim. Here the anterior border of the palmar surface is more regularly rounded than in Kowalevsky's specimens, except for the more conspicuously marked emargination in the median line and the groove which runs proximally up the median line of the anterior face of the bone from this emargination. The phalanx is narrower in proportion to its length and the facet for the second phalanx is very steeply inclined to the plane of the palmar surface than in either of the French types, and apparently the bone is more depressed than in the latter. Part of the difference between Kowalevsky's and Gaudry's figures may be due to the fact that the former is of the hind foot and the latter of the fore foot, but this assumption would not account for the Steinheim type, which is different from both.

The ungual phalanx of *A. equinum* is decidedly more like the Steinheim type than either of the French ones, and differs from it principally in the better development of the "basilar processes" and "wings" and in the less deep lateral constrictions of the bone below the proximal head.

Hind Limb. The pelvis is very like that of *Mesohippus*, except in size, and approximates the modern type but little more than does that of the White River genus. As compared with the pelvis of the horse, the neck or shaft of the ilium is much longer, the plate less expanded and everted, and the gluteal surface less concave; the pit for the origin of the rectus femoris muscle is smaller, deeper, and much nearer to the acetabulum. The iliac surface is rather narrower and the pubic border less prominent than in *Mesohippus*. The acetabulum has prominent margins and the sulcus for the round ligament is less extensive and narrows the articular surface less than in *Equus*; it has the peculiarity that the end of the sulcus, where the anterior and posterior borders meet, is angulate instead of curved. The ischium is straighter and more slender, the obturator foramen very much larger and more oval, and the descending plate of the ischium much less expanded than in the modern form. The supra-acetabular crest is but feebly developed and the tendinal sulci not deeply cut. The pubis is likewise more slender and less rugose than in *Equus*. Little is known of the pelvis in *A. aurelianense*, but the fragments preserved show an important difference from the American species in the ischiadic or supra-acetabular crest, which is more rounded and thickened even than in the horses. Both species agree in having a sulcus for the tendon of the internal obturator muscle.

The only other part of the hind limb of *A. equinum* which is known consists of some fragments of the distal ends of the metatarsals and phalanges of another specimen. These are larger than the corresponding parts of the manus, but otherwise like them.

The type specimen of *A. equinum* was found by Mr. I. Benet in the upper beds of Deep river (lower Loup Fork), Mont.

Measurements.

	A. EQUINUM.	A. AURELIANENSE.
	M.	M.
Humerus, length	.224	.230
Humerus, width of proximal end	.066	.063
Humerus, depth of proximal end	.072	.075
Humerus, width of distal trochlea	.053	.049
Radius, length	.265	.250
Radius, width of humeral trochlea	.051	.050
Radius, width between inferior tuberosities	.050	.060
Radius, width of shaft in the middle	....	.030
Radius, depth of shaft in the middle	....	.019
Radius, depth of humeral surface	.026	.025
Radius, width of facets for the ulna	.031	.040
Scaphoid, width of proximal end	.019	.017
Scaphoid, width at middle	.016	.014
Scaphoid, width of distal end	.018	.015
Scaphoid, height of anterior face	.021	.023
Lunar, width of distal end	.018	.017
Lunar, width of unciform facet	.007	.005
Lunar, height of anterior face	.022	....
Cuneiform, height	.016	....
Cuneiform, depth of distal end	.023	....
Trapezoid, height	.012	....
Trapezoid, width	.011	....
Magnum, anterior height	.015	.013
Magnum, anterior width	.030	.025
Magnum, posterior width	.010	.007
Magnum, posterior height	.018	.021
Magnum, depth	.026	.026
Pisiform, length	.033	....
Pisiform, height of proximal end	.011	....
Metacarpal iii, length	.194	.196
Metacarpal iii, width of proximal end	.028	.030
Metacarpal iii, width in the middle	.023	.024
Metacarpal iii, width of distal end	.028	.028

	A. EQUINUM. M.	A. AURELIANENSE. M.
Metacarpal iii, depth of proximal end	.023	.024
Metacarpal ii, length	.179	....
Metacarpal ii, width of proximal end	.010	.008
Metacarpal ii, depth of proximal end	.014	.013
Metacarpal ii, width of distal end	.011	....
Metacarpal ii, depth of distal end	.020	....
Metacarpal iv, length	.177	....
Metacarpal iv, width of proximal end	.011	....
Metacarpal iv, depth of proximal end	.014	....
Metacarpal iv, width of distal end	.012	....
Metacarpal iv, depth of distal end	.020	....
First phalanx of median digit, length	.040	.040
First phalanx of median digit, width of proximal end	.033	....
First phalanx of median digit, width of middle	.027	.028
First phalanx of median digit, width of distal end	.026	.027
Third phalanx of median digit, length	.043	.041
Third phalanx of median digit, width of proximal end	.033	.0285
Third phalanx of median digit, maximum width	.046	.044
First phalanx of lateral digit, length	.026	.027
Second phalanx of lateral digit, length	.015	.016
Third phalanx of lateral digit, length (plantar border)	.042	.028

The Systematic Position of Anchitherium.

The relation of *Anchitherium* to the other genera of the equine phylum is a problem of more than ordinary interest, for if we can once establish its systematic position with reasonable probability, we shall find that the inferences which may be drawn from the facts have a very important bearing upon many of the open questions as to the mode in which transformation may operate in a given case. The European palæontologists have very generally regarded this genus as ancestral to the modern *Equidæ*, and many of these authorities have derived *Anchitherium* from *Palæotherium*, *Paloplotherium*, or some similar type. Had the wonderful series of American equines never been discovered, it is highly probable that this result would not have been disturbed, though in the light of present knowledge it cannot be accepted. It is not worth while to argue against the derivation of *Anchitherium* from *Palæotherium* or an allied genus, for since Marsh directed attention to the equine nature of the Eocene *Hyracotherium* and its allies, the older hypothesis has been almost entirely abandoned, but the position of the genus before us with reference to the existing *Equidæ* and to preceding genera is a much more difficult and obscure problem, more especially since it involves the supposed dual origin and parallel lines of horses in the Old World and the New.

The facts which exploration is continually bringing to light tend more and more strongly to the confirmation of Schlosser's view. "Derselbe [d. h. der Pferdestamm] hat schon frühzeitig Representanten in Europa sowohl als auch in Nordamerika, doch sind nur die neuweltlichen Glieder dieses Stammes von wesentlicher Bedeutung, indem die altweltlichen sämmtlich früher oder später ohne Hinterlassung von Nachkommen wieder ausgestorben sind. Die europäische Reihe ergänzte sich immer wieder durch Einwanderung amerikanischer Typen. Erst vom Pliocän an scheint der Pferdestamm in der alten Welt weiter entwicklungsfähig geworden zu sein" (No. 30, p. 486).* That the genus *Anchitherium* itself, even in the restricted sense in which I have used that term, is of American rather than European origin is rendered probable by the following considerations: (1) In the Old World the equine series is very fragmentary and incomplete; between *Pachynolophus* of the upper Eocene and *Anchitherium* of the upper Miocene there is a great gap, which no known European genus tends to bridge over, for assuredly *Anchilophus* cannot be considered in this connection. The three descending stages in the phylum, which we call *Epihippus, Mesohippus* and *Miohippus*, have as yet yielded no representatives at all in Europe, and even should one or other of them be found there hereafter, it is not in the least likely that such a wealth of individuals and species as characterizes the various horizons of the upper Eocene and the Miocene in this country will be discovered in the Old World. That the line should be thus broken in the Eastern and uninterrupted in the Western Hemisphere is surely a strong indication that the latter was the theatre of its development, especially in view of the abundance of both individuals and species. (2) There is little difficulty in deriving *Anchitherium* from some of the species of *Miohippus;* the changes involved are slight, though some of them are of much morphological significance. (*a*) In the first place, there is great increase in size, both of the known species of this genus much exceeding any known form of *Miohippus.* (*b*) In the upper molars and premolars the conules are reduced in relative importance and the posterior transverse crest has become connected with the outer wall of the crown. (*c*) In the lower premolars the internal cusps (a, a^1, b, b^1, of Rütimeyer) are likewise reduced, and in more or fewer of these teeth the pillars, anterior and posterior, are obsolete. A similar tendency may be observed in some forms of *Miohippus.* (*d*) The odontoid process, which in the John Day genus is just beginning to assume the spout-like shape, has in *Anchitherium* become as completely so as in the horse. (*e*) The median digit of both manus and pes has become greatly enlarged and thickened, though there is no great reduction of the lateral digits, and

*I believe Mme. Pavlow has expressed a similar opinion as to the position of *Anchitherium,* though I cannot lay my hand upon the reference.

in the Steinheim specimens they seem even to be enlarged. (*f*) The median ungual phalanges are much elongated, but in most forms of the genus they are much depressed and flattened and have gained but little in vertical diameter.

Some of the species of *Miohippus* already point in the direction of *Anchitherium*, as we have seen to be the case in regard to the inner cusps of the lower teeth. The typical form of ungual phalanx in the John Day genus is that of *M. anceps* as figured by Marsh (No. 27), in which that of the middle digit is relatively short and differs but little from the hoof of *Mesohippus*, but in a specimen obtained by the Princeton party of 1889 on the Middle Fork of the John Day river, in eastern Oregon, this phalanx is very much elongated, depressed and narrowed, so as to recall in a striking manner the corresponding bone of *Anchitherium* (see Pl. II, Fig. 16). As this specimen is not accompanied by teeth, I cannot yet refer it to any described species of *Miohippus*, but that, in one respect at least, this species tends strongly towards *Anchitherium* is obvious. There remains, however, one point as to which there is much uncertainty. In *A. aurelianense* the meso- and ectocuneiforms are coössified, while in all other equines in which the tarsus is known the external cuneiform is free and the median united with the internal. Kowalevsky does not state how many specimens he was able to examine, and thus to determine whether the condition which he describes in the French forms is the invariable rule or only an occasional variation, such as Forsyth Major has shown to occur not very infrequently among recent horses (No. 15, p. 63). Unfortunately, nothing is known as to the condition of the tarsus, in this respect, of the specimens from Steinheim and of *A. equinum*.

Until the question is determined as to whether the coalescence of the meso- and ectocuneiforms be the normal condition in *Anchitherium*, it is useless to speculate on the way in which this peculiarity was brought about, but a hint of the possible method is given by the specimens shown in Pl. II, Fig. 15, which is of a White River *Mesohippus*. In this animal all three cuneiforms have coalesced into a single piece, which may possibly have been the first step, to be followed later by a separation of the internal element. That this particular case is perhaps pathological, is indicated by the ankylosis of the second and third metatarsals, or it may be due merely to age, as there are no exostoses in the joint. Nevertheless, the specimen is not without suggestive value, and the example of the recent horses shows us that such changes may and do take place in the individual. Another indication that variations looking to *Anchitherium* were commenced as early as the genus *Mesohippus*, is afforded by the curious species of that genus, *M.* (*Anchitherium*) *cuneatus* Cope, to which Prof. Cope has called my attention. This species displays a strong tendency to assume the concave and inwardly projecting external crescents of the upper teeth, which are so characteristic of *Anchitherium* and which have, perhaps, as much as any other feature, led to the view of its derivation from *Palæotherium*. (3) *Anchitherium* has now been found in America in strata which are probably as old as, if not older than, those of Sansan and Steinheim, and there is thus no geographical or geological objection to assuming that the two species of this genus have both been derived from some species of *Miohippus* as yet not identified. We may hope to learn much upon this subject when the various species of the John Day genus have been more fully described and their variations in tooth and foot structure correlated.

So far as the relations of *Anchitherium* to later genera of the equine series are concerned, I think the evidence now available strongly confirms Schlosser's view, already quoted, that this genus is an abortive side branch of the main phylum, which died out, leaving no successors behind it. (1) The teeth of *Anchitherium* are in some important respects less characteristically horse-like than those of the more ancient genera, as may be seen from the following facts. (*a*) In the lower molars and premolars of the *Equidæ* no feature is more characteristic than the two pairs of internal cusps (a a^1, b b^1), which originated at a very early period and steadily increase in size and importance until they reach their maximum development in the modern forms. Now, in *Anchitherium*, these elements are reduced in prominence; on some teeth they are missing, and, as in the case of disappearing structures generally, they are very variable. Thus, in the case of the large *A. aurelianense* from Steinheim, figured by Fraas, the anterior pillar is absent on $\overline{\text{m. 3}}$, present on the others; the posterior pillar is much reduced on $\overline{\text{m. 1}}$, absent on $\overline{\text{m. 2}}$. Kowalevsky's specimens are too advanced in wear to show these features, but in a lower jaw from Sansan containing $\overline{\text{m. 2}}$ and $\overline{\text{m. 3}}$, which the Princeton museum owes to the kindness of Prof. Gaudry, the anterior pillar is not found in the last or the penultimate molar, and $\overline{\text{m. 2}}$ has no posterior pillar. The same description will apply to *A. equinum*. In this connection it is important to note that in the milk molars of *A. aurelianense* these pillars are much more conspicuously developed than in the permanent teeth (see Kowalevsky, Pl. III, Fig. 58). (*b*) In the upper cheek-teeth the posterior conule retains its importance throughout the equine series, and yet in *Anchitherium* it is so much reduced as to be hardly recognizable. (*c*) The external cusps of the superior molars and premolars in *Mesohippus*, *Miohippus*, *Desmatippus*, *Protohippus* and *Equus* are but slightly concave and do not project inward in any marked degree, while in *Anchitherium* these cusps are more decidedly concave than in any of the earlier or later genera, and their apices project inward in a way that recalls the molars of the titanotheres. All of these features tend to indicate that the dentition of *Anchitherium* had entered upon a course of development which was not in the direction of the typical horses, but leading away from them, and that in consequence the genus had no place in the direct line.

(2) If we may assume that the coalescence of the meso- and ectocuneiforms in the tarsus is really characteristic of the genus, we shall have a further reason for denying *Anchitherium* a place in the direct ancestry of the horses, for it seems unlikely that the modern condition should have been already attained in *Mesohippus*, lost in *Anchitherium*, and reacquired by the subsequent genera. But, in view of the uncertainty as to the typical character of this structure, we cannot insist strongly upon it.

(3) The very curiously elongated and flattened hoofs of this genus also militate against the view that it belongs in the direct line, since in the change of *Miohippus* to *Desmatippus* they do not represent one of the stages of the transition which we should expect to find.

(4) The very large size of both the known species of *Anchitherium*, one European and the other American, would seem to indicate that this is characteristic of the genus. This size much exceeds that of the forms which, on the hypothesis that *Anchitherium* belongs in the main series, must be regarded as its successors, and such alternations in bulk are unlikely.

(5) There is no vacancy in the direct equine phylum which *Anchitherium* can fill, as the change from *Miohippus* to this genus, though of a different kind, is hardly less in amount than that from *Miohippus* to *Desmatippus*, and to insert *Anchitherium* in the series would be to assume a view of zigzag development, which, as to amount, is unnecessary and unwarranted. As we shall see later, a certain degree of such alternating advance and retrogression very probably does take place, but not to such an extent as this hypothesis would involve. It might be thought that the occurrence of *Anchitherium* in the same horizon with the more modernized genera, *Protohippus* and *Desmatippus*, would be a further argument for excluding the first-named genus from the phylogeny. This fact must, of course, be allowed some weight; but as it is, perhaps, a case of the survival of an older form, just as *Desmatippus* very probably is, no great importance can be attached to it. Such cases must usually be decided upon morphological grounds.

If the view as to the systematic position of *Anchitherium* here contended for be correct, it follows that those features in which this genus approximates the modern forms more closely than does *Miohippus* are phenomena of parallelism. As such, these structures deserve careful attention. Assuming the possibility of parallel development, we might on *à priori* grounds lay down the general principle that the more nearly allied any two organisms are, the more likely will they be to independently acquire similar modifications. For development is the resultant or outcome of the interaction of two great groups of factors, viz., the nature of the organism and the character of the environment, and obviously the more nearly alike these two classes of factors are, the greater the similarity to be expected in the result. To use Darwin's words: "The members of the same class, although only distantly allied, have inherited so much in common in their constitution that they are apt to vary under similar exciting causes in a similar manner; and this would obviously aid in the acquirement through natural selection of parts or organs strikingly like each other, independently of their direct inheritance from a common progenitor."* Thus there are certain characters which have repeatedly arisen in the artiodactyls, but are not known outside of that group. An example of this is given by the teeth; I have elsewhere shown that the selenodont molar has been, in all probability, independently acquired by at least three very distinct phyla, not including others in which the molar pattern is slightly aberrant from the typical four crescent plan, but outside of the suborder no tooth is known which presents more than a superficial resemblance to this pattern. That this is not, however, the limit of the process, is shown by the spout-shaped odontoid process of the axis in many ungulates, the bicipital tubercle and double bicipital groove of the humerus in the horse and camel, and the numerous resemblances between artiodactyls and perissodactyls which have not been inherited from their common ancestors, the Condylarthra. Indeed we are as yet very far from being able to set a limit to the possibilities of this mode of development, not to mention at all the phenomena of convergence. What is here contended for is the principle (at first sight the most obvious truism) that numerous and close resemblances of structure are *prima facie* evidence of relationship, even though many of these resemblances be due to parallelism, and further, that such parallelisms, when properly understood, may be of great value in morphological and phylogenetic speculation. Even when we exclude *Anchitherium* (and very probably the same reasoning will apply to *Hipparion*) from the direct line of equine descent, we find that most of the conclusions as to the steps of modification in this line which were deduced from the older hypothesis (except, of course, so much of it as referred to the relationships of *Palæotherium*) are still valid and need to be revised only in comparatively few details. Should it prove to be the case that *A. aurelianense* and *A. equinum* have no nearer connection than through some species of *Miohippus*, which was ancestral to

* My attention was called to this passage by its quotation in Prof. H. T. Fernald's paper on "The Relationships of Arthropods" (Baltimore, 1890), which the author has kindly sent me. I have been much interested to see how well Fernald's results in Arthropods agree with my own in mammals.

both, this would not diminish the value of either for understanding the systematic position of the other, but would rather enhance it, for this would render more intelligible the fact that, on comparing the two species, we find now one and now the other more closely approximating the modern standard, and again, both agreeing in some advance beyond *Miohippus*, either towards or away from the modern horses.

As examples of these parallelisms, the following may be selected. (1) In the upper cheek-teeth of *Miohippus* the posterior transverse crests are separated from the external wall, while in *Anchitherium* they have become coalesced with it. This also happens in the direct line, beginning with *Desmatippus*. (2) In the upper incisors the pit or "mark" is much better developed than in the John Day form. (3) The orbit has been shifted farther back than in most of the species of *Miohippus*, though not so far as in *M. præstans*. (4) The size of the animal has greatly increased, and the changes which accompany augmented size and weight, such as heavier limb bones with better developed processes for muscular and ligamentous attachments, are well shown. (5) In *Miohippus* the spout-like shape of the odontoid process of the axis is but barely indicated by a slight elevation of its lateral margins, while in *Anchitherium* this character is much more pronounced and is even carried somewhat farther than in the horse. (6) The median digit in both manus and pes is enlarged, and in consequence the magnum in the carpus and the ectocuneiform in the tarsus have become relatively broader and lower. In these respects the two species agree, in others they differ as to the degree of approximation to the modern standard.

In the following respects *A. equinum* is more modernized than *A. aurelianense*. (1) The base of the cranium is more elevated above the plane of the molar teeth, and this brings about an increase in height of the ascending ramus of the mandible and the mandibular condyle is raised higher. (2) The humerus is much more equine in structure, the external tuberosity being reduced in size, the bicipital tubercle much enlarged, median in position and dividing the bicipital groove into two parts; the distal end also is almost completely like that of the horse in construction. (3) The radius is more equine in the expansion of the extremities, widening and flattening of the shaft, the shape of the carpal facets, and in the position of the tubercle for the insertion of the biceps muscle. (4) The olecranon of the ulna has the inward curvature characteristic of the recent horses; the distal facet for the cuneiform is also more as in *Equus*.

On the other hand, the European species approaches the recent type in several points of structure more nearly than does the American. (1) The lower incisors have the pit or enamel invagination as well marked as the upper. The exact significance of this difference between the two species is not quite clear; it may imply that

A. equinum has lost the structure in question, as is the case with certain horses from the Pliocene of Florida, to which Cope has called attention, or, as is more probably true, the American species never acquired the character. Prof. Cope very kindly allowed me to examine his beautiful series of specimens of *Miohippus* from the John Day beds of Oregon, and in all of them I found that, while the invagination was fairly well marked in the upper incisors, it was not indicated at all in the lower. (2) The sigmoid facet of the ulna is not continuous, but interrupted on the external side by a deep sulcus. (3) The facets on the pisiform for the cuneiform and ulna, respectively, are widely separated. (4) In the specimens from Sansan (but not those from Steinheim, which perhaps should be referred to a different species) the median ungual phalanges are less depressed and flattened and those of the lateral digits are decidedly more reduced in size than those of the American species. (5) The keel on the distal trochlea of the median metacarpal, and the corresponding groove on the proximal phalanx, are more extended anteriorly. This appears not to be true of the specimens from Steinheim, and doubtless, as Kowalevsky has suggested in the case of *Hipparion*, the shortening of the lateral digits is causally connected with the increased size and importance of the metapodial keels.

The evidence here brought forward seems to lead us to the following conclusions. The genus *Anchitherium*, in the restricted sense of the term, is of American origin and reached Europe by migration. It cannot be regarded as a member of the direct ancestry of the modern *Equidæ*, but as a side branch of that stem, which was probably derived from some of the John Day forms not as yet identified. Though appearing later in time than these forms, it nevertheless is in some respects more widely removed from the recent horses than they. This is notably the case in the dentition, where the "pillars," and especially the anterior ones, of the lower molars and premolars, and the posterior conule of the upper, appear to be undergoing a retrogressive metamorphosis. Further, in no species of *Miohippus*, or even of *Mesohippus*, are the lateral metapodials so large as in the Steinheim form of *A. aurelianense.* Some of the John Day species have a distinctly more modernized type of skull than any species of *Anchitherium.* In *M. præstans*, for example, the orbit is very far back, shifted almost entirely behind the line of the molars. While the skull of *A. equinum* has great vertical depth in the orbital region, the orbit remains very low in the face and the zygomatic arch descends very abruptly in its passage forward. Though we have still, it is obvious, much to learn as to the exact relationship between *Anchitherium* and *Miohippus*, the general position of the former with reference to the main equine stem is now reasonably clear.

Taking now a broader view of the series of equine genera which have been described in the preceding pages, we find that it is fitted to throw very welcome light upon some disputed questions of evolutionary philosophy. In a former paper (No. 33, p. 371) I considered the problem as to whether the differentiation of any group is a steadily advancing one (or retrograding, as the case may be), interrupted only by relatively stationary periods of rest, or whether it should rather be regarded as progressing in a spiral, advancing, on the whole and in the long run, but with many deviations, setbacks and retrogressions. The evidence then available from fossil mammals did not seem to give any very definite answer to this question, and, while the new material offers important help in the solution of the problem, we cannot hope to solve it definitely. The grand difficulty in the way of applying the results drawn from the study of mammalian phyla to the solution of such general questions lies in the fact that only very rarely can we construct a phylogeny of species as distinguished from that of genera, and the latter are too vague for the purpose. A hardly less formidable difficulty is caused by the influence of migrations from one region to another. The phenomena of parallelism, interesting as they are in themselves, are often impossible to distinguish from the effects of a common inheritance, and the tendency in successive genera to repeat similar cycles of specific variation only adds to the confusion. Sometimes an apparently simple and easy step in advance is delayed for an incredibly long period. Thus in the little *Mesohippus* the ulna is as much reduced and as frequently coössified with the radius as in the very much larger *Anchitherium* which appears so much later in time. The lachrymal pit is constant until we reach *Miohippus*, when it becomes subject to variation, one species at least being devoid of it, while in the much more advanced genera, *Protohippus* and *Hipparion*, the same variation is found, some species having the pit and others not. Yet a phylogenetic scheme founded upon the presence or absence of the lachrymal depression would lead to absurd results. Still another obstacle to progress in these questions is found in the conditions of preservation of the fossils. As we examine large series of forms from several successive horizons, we find that the great majority of species and genera are confined to one or two formations and that each succeeding fauna is recruited partly by migration from other regions, partly by the rapid expansion of a comparatively few adaptive and plastic types, while most of the forms which were especially fitted for the older conditions die out under the new. Now, the collections contain, principally, the dominant and abundant species of any given horizon, and these are frequently not the ancestors of the species which will be dominant in the succeeding period. Only rarely do we find so many lines keeping on without break from one horizon into another as those which pass from the White

River up into the John Day. Hence the exceptional value of those two formations for the study of phylogenetic problems.

Admitting the full weight of the difficulties above mentioned, some general principles stand out clearly from the confusion. The clearness may be deceptive, but that must be determined by wider investigation. In comparing the series of horse-like genera, we are struck at once by two facts: first, the steady advance of differentiation in the main, and, secondly, the continually alternating progress and regression in certain minor details. Every genus is in some respect or other, often very trivial, less modernized than its predecessor. For example, we have seen that, in certain details of the carpus and tarsus, *Mesohippus* is more advanced than *Miohippus*, *Miohippus* more than *Desmatippus*, and the latter again than *Protohippus*. It is worthy of note that not always the same structures are affected by the retrogression in the various genera; we do not find continual advance in some respects balanced by continual retreat in others. On the contrary, each genus would appear to recover part, at least, of the ground lost by its predecessor, but to lose in some other direction itself. Part of this appearance of alternation is no doubt due to individual variation, for a character is often long subject to great variation before becoming finally established, and, as already stated, there is in each successive genus a tendency to run through similar cycles of variation. No doubt, also, allowance must be made for the difficulty of constructing a phyletic series of species, so that, if these appearances were confined to the horses, no great weight could be attached to them, but every phylum which I have been able to carefully examine displays the same phenomena. In view of the very close connection between the John Day and White River beds, there can be very little doubt that *Miohippus* has descended from one or more species of *Mesohippus;* but if so, and unless the ancestral species of the White River genus has not yet been discovered, the principle must be admitted. The sulci which invade the articular surfaces of the tarsal bones, and are so conspicuous in the recent horses, have already commenced in *Mesohippus*. In that genus they are variable, but, so far as I have been able to observe, they are more constantly present and larger than in *Miohippus*, its successor. None of the known species of the latter genus fulfills all the conditions which are required of a form ancestral to *Anchitherium*. Some do so in one respect, others in another, none in all. If this alternation in minute details is to be rigidly excluded, I know of no species among fossil mammals which can claim to be ancestral to another, and unless, therefore, we are prepared to admit that no two species which have been found in successive formations stand in a direct relation of descent to one another, there would seem to be no escape from the conclusion that, in some cases at least, the general differentiation of a line may be accompanied by an ebb and flow in certain minor characters, illustrating what Galton has called the "regression to mediocrity." This does not imply an all-round, indeterminate variation; the changes are alternately towards and away from a certain definite standard, and are sometimes repeated in one succeeding form after another, while in other cases a new set of characters are affected. Indeed, if we admit the possibility of parallel developments, and that, at least, is demonstrated by the fossils beyond peradventure, the possibility of alternations follows of itself.

While there is very little in favor of the view of indeterminate variation to be derived from a series of fossil mammals, yet *Anchitherium* does display some variations which appear to be of this character. Thus Filhol has noticed the instability of the tubercle which sometimes appears in the entrance to the median valley of the upper teeth. "Il semble qu'il n'y ait aucune tendance à des modifications de la structure des dents. Le seul fait que j'ai pu constater, et qui a une bien petite importance, consiste dans la présence ou l'absence d'un denticule d'émail qu'on trouve aux dents supérieures, entre les denticules internes. Sur la pièce que j'ai fait représenter on observe ce denticule sur les trois dernières prémolaires et sur la dernièrne molaire; sur un autre échantillon il existe sur toutes les dents, alors que sur deux autres il fait absolument défaut sur les molaires vraies" (No. 13, pp. 193, 194). In the specimen of *A. equinum* which I have described, a similar tubercle occurs in the posterior valley of the first lower molar, which is doubtless of the same variable character. In none of the equine genera do these tubercles attain any importance, and they have, therefore, the appearance of being indeterminate variations.

Another principle may be deduced from the facts of equine descent, viz., that a slight degree of specialization in a direction away from that taken by the main line is not incompatible with a place in that line. Thus the elbow joint of *Mesohippus* is curiously specialized in a fashion that does not occur in any of the later horses; the outer portion of the humeral trochlea projects laterally and is flared in a peculiar manner, forming with the corresponding surface on the radius a joint which allows an extraordinary degree of flexion. But for the obliquity of the trochlea, which throws the radius outward when the arm is flexed, the two bones could be brought into contact for almost their whole length without dislocation. It may be objected that no known species of *Mesohippus* is really in the direct series, and that the ancestral species did not have this peculiarity, but this seems improbable from many points of view, especially when it is remembered that a trace of the same structure may be observed in *Miohippus*. If true at all, this principle is of wide application, but it must not be pushed too far, for nothing seems better established than the belief that premature specialization in any conspicuous degree is fatal to the permanence of a line, examples of which may be found abundantly in every horizon. In the case of *Anchitherium*, it may seem that I have excluded it from the main phylum on very trivial grounds, deviations which are no greater than the elbow joint of *Mesohippus*. But in the teeth of *Anchitherium* we find that characters which are constant in all the genera before and after it, characters in the continual development of which lies the peculiarity of the evolving equine dentition, are reduced or entirely lost. Of itself, perhaps, this fact would be insufficient to justify us in excluding the genus from the direct line, but it coincides, as we have seen, with many other facts, all of which point to the same conclusion.

The following table expresses concisely the relationships of the various Oligocene and Miocene equine genera, according to present information.

Loup Fork, ...		*Protohippus.*	*Hipparion.*
Deep River, . .	*Anchitherium.*	*Protohippus.*	
(Hiatus), . . .	*?Anchitherium.*	*Desmatippus.*	
John Day, ...		*Miohippus.*	
White River, ...		*Mesohippus.*	

Rhinoceridæ.

CÆNOPUS? Cope.

The rhinoceroses of the lower beds of the Deep River valley are represented in the collection only by some portions of mandibles which contain much mutilated teeth. These remains are altogether too uncharacteristic to admit of generic reference.

APHELOPS Cope.

Bull. U. S. Geol. and Geogr. Surv., No. 1, 1874, p. 12.

The upper beds yielded some fragmentary remains of a large rhinoceros which almost certainly belong to *Aphelops*. The best preserved of these is a portion of a skull, including the occiput, zygomatic arch and roof of the cranium, together with fragments of the molar teeth and superior maxillary bone, but, in the absence of characteristic parts of the skull, the specific reference of this specimen is uncertain. The antero-posterior concavity of the upper profile of the cranium, and the rise towards the occipital crest, constitute a resemblance to *A. megalodus*, though these features are less emphasized than in that species. On the other hand, the projecting occipital condyles and long, laterally compressed postglenoid process, with its rugose posterior border, are rather more like those of *A. fossiger*. The posttympanic process of the squamosal does not quite reach the postglenoid, while in most specimens from the upper Loup Fork beds there is a more or less extensive contact between the two processes, though they do not seem to be coössified.

As I pointed out several years ago (No. 35, p. 16), the line of the horned rhinoceroses of the Old World diverged at an early period from the American hornless series; the two phyla cannot well have any common ancestor more recent than the Aceratheria of the White River Oligocene. It follows from this that those features in which *Aphelops* and its congeners resemble the modern genera more closely than do the White River species, have been independently acquired in the two lines. These resemblances are numerous and, because of the confidence with which we may regard them as parallelisms, worthy of enumeration.

The following brief summary of the points in which *Aphelops* approximates the modern standard more than do the White River forms is taken principally from the papers of Cope and Osborn upon that genus. (1) The increased size and robustness of the skeleton, as compared with that of the older genus, are very marked, and in some species (*e. g.*, *A. fossiger*) carried even beyond the condition of the recent species, so as to produce, as Cope has shown, the proportions of the hippopotamus rather than those of any recent rhinoceros. (2) The upper incisors are reduced to a single one in each premaxillary. In the Loup Fork genus, *Peraceras*, these teeth have been lost entirely, as in the recent African form, *Atelodus*. (3) The superior premolars have become more thoroughly molariform by the more complete separation of their internal cusps (deutero- and tetartocones). (4) The upper molars have increased in size and have become more complicated through the development of spurs upon the transverse crests. (5) The shape of the occiput is much more modernized than in *Cœnopus*, and in most of the species the upper contour of the skull is concave, rising more or less steeply towards the inion. (6) The postglenoid and posttympanic processes of the squamosal are in contact. (7) The postglenoid is less like that of the tapir in character and has an elongated styliform shape, as in the recent rhinoceroses. (8) The sagittal crest is shorter and less prominent and the cranial cavity more rounded and capacious. (9) The foramen lacerum anterius and foramen rotundum have become confluent. (10) The foramen lacerum medium and foramen ovale are much more closely approximated and sometimes confluent. (11) In the humerus, the deltoid crest is much better developed. (12) In the carpus, the magnum does not support the lunar anteriorly, and the latter element has shifted more completely upon the unciform. (13) The fifth digit is reduced to a nodular rudiment of the metacarpal. (14) "The femur of the species from the earlier formations may be readily distinguished from that of those of the later Tertiaries by the forms of both the extremities. In the Aceratheria, this bone resembles that of the tapirs in the form of the great trochanter. This process is produced at its external border, has a recurved apex, and encloses a deep trochanteric fossa. In *Aphelops* it is precisely as in *Rhinocerus*, obliquely truncate externally, without prominent apex or well-marked fossa. In the Aceratheria the inner crest of the rotular groove is but moderately prominent; in *Aphelops* and *Rhinocerus* it is greatly developed" (Cope, No. 4, p. 771[e]). (15) The astragalus has become lower and broader and has a much more extensive bearing upon the cuboid, and the calcaneum is shorter and more massive.

With these resemblances, *Aphelops* presents many divergences from the true rhinoceros series, which Osborn has thus summed up: "The subtriangular shape of the scapula, the very elevated position and sessile character of the deltoid ridge of the humerus, the spreading manus, and the comparatively feeble development of the third trochanter of the femur" (No. 28, p. 98). To these may be added certain constant differences in the character of the skull. The presence of horns in one series and the absence of them in the other is doubtless the cause of these divergences in skull structure. Leaving out of view the problematical *Diceratherium*—a genus which is common to both hemispheres, and the relationship of which to the other genera of the family is still far from clear—all the American forms have weak and slender nasals; the sagittal crest is retained, in striking contrast to the broad, flattened cranium of the horned genera, and the development of air sinuses in the bones which surround the cerebral cavity is carried only to a moderate extent. Still farther differences between the two series occur in the details of the tarsus and the mode of articulation of these bones with the metatarsus.

It may be fairly concluded that the American hornless genera, while running parallel to the horned rhinoceroses of the Old World in many very striking ways, nevertheless form a series entirely independent of them.

ARTIODACTYLA.

Oreodontidæ.

MESOREODON Scott.

Amer. Naturalist, 1893, p. 661.

Oreodonts with skull structure very similar to that of the John Day genus, *Eporeodon*, but with molars showing an incipient tendency to hypsodontism. Feet constructed as in *Merychyus.* Manus "adaptively" reduced, the third metacarpal articulating with the trapezoid. A rudimentary clavicle present. Larynx with ossified thyroid cartilage.

It may seem that this form is not generically separable from *Eporeodon*, and the relationship between the two is certainly very close; but if so, it must be given at least subgeneric rank. Animals of this type are much the most abundant fossils of the lower Deep River beds, outnumbering in wealth of individuals all the other species in the collection taken together. Two species are found in association.

MESOREODON CHELONYX Scott.

(*loc. cit.*)

Size exceeding that of *Eporeodon*, teeth large, zygomatic arches depressed, occiput drawn out into supero-lateral wings, metapodials rather short and stout, ungual phalanges trowel-shaped and pointed.

This species is very much the more abundant of the two and is represented in the collection by a large number of specimens, so that, with the exception of some vertebræ and ribs and the sternum, all parts of the skeleton may be described. A considerable degree of variation obtains among these specimens, both in regard to size and in other more important respects. Some of these differences, however, are almost certainly of a sexual nature, and they give no satisfactory reason for establishing another species.

I. *Dentition.* A. *Upper Jaw* (Pl. V, Fig. 36). The incisors have small and simple crowns, which are antero-posteriorly compressed and in the unworn state are somewhat pointed. In size, they increase regularly from the first to the third. The canine is of the ordinary trihedral recurved shape characteristic of the family, but differs from that of the older genera in having upon its inner face a deep groove, bounded before and behind by sharp enamel ridges.

The premolars are relatively larger than in *Oreodon* or *Eporeodon* and have a different external form, which constitutes an approximation to *Merychyus.* The change consists in an elongation of the crown, both vertically and antero-posteriorly, in the disappearance of the median ridge on the outer side of the protocone, as well as of the external cingulum, of which a trace is retained on p. 4. The construction of the internal side of the crown is very much like what is to be found in *Oreodon*, but the ridges and hollows are, for the most part, better developed, and there are other minor differences. In all the premolars the protocone is a compressed and trenchant pyramidal cone, terminating below in an acute point which is in the median line of the crown. The first premolar has a slightly convex external face and is not so wide transversely as in the White River genus, especially in the posterior half; on the front edge there is a fossa bounded by an internal ridge which descends parallel to the edge of the protocone, and a faintly marked posterior fossa is formed by a slight elevation of the cingulum. This tooth is therefore of a somewhat different shape and simpler pattern than p 1 of *Oreodon*. The second premolar is larger than p. 1, but has a similar external form with convex face; internally there are two anterior fossettes, the second of which is formed by the anterior cingulum, and the posterior fossette is much deeper than in p 1. All of these internal ridges are more prominent than in the White River genus, but the transverse diameter of the crown is less. The third premolar has a slightly concave external face, and the internal crests and cingulum are better developed than in p 2. The anterior ridges are more conspicuous than in *Oreodon*, but the posterior cingulum, or deuterocone, very much less so, and this, combined with the narrower crown, gives the tooth quite a different appearance in the two genera. In p. 4 we find the usual pair of crescents, the proto- and deuterocones, as in the selenodonts generally; the transverse width of the crown is somewhat greater in proportion, the protocone more compressed laterally and the valley narrower, though deep, than in *Oreodon*.

The molars are like those of *Eporeodon*, but with a certain resemblance to those of *Merychyus;* this likeness is to be seen in a heightening of the crown vertically, narrowing of the valleys, the compression or thinning of the external buttresses (para- and mesostyles) and in the fore-and-aft extension of the postero-external crescent in m. 3. On the other hand, the characteristic feature of the *Merychyus* molar, viz., the extension of the posterior horn of the crescentic protocone, cutting off the anterior horn of the hypocone from contact with the outer wall, is not present. In m. 1 and m. 2 the postero-internal crescent is developed at the expense of the antero-internal, which is especially small in m. 1, but in m. 3 the two are of nearly equal size and the adjacent horns are in close contact at their extremities. M. 3 has a well-developed outer fold or buttress at the hinder edge of the metaconid, which extends beyond the posterior horn of the inner crescent as in *Eporeodon* and *Merychyus*, but not in *Oreodon*.

B. *Lower Jaw.* The incisors are smaller than in *Eporeodon* and have chisel-shaped crowns, with an internal cingulum upon the second and third; all three are of nearly equal size and are quite strongly procumbent. The canine is larger than the incisors, to which series it functionally belongs, and is, like them, quite procumbent.

The first premolar has the caniniform shape and function characteristic of all the genera of the family except *Pithecistes;* there is a very marked difference in the size and shape of this tooth in the various specimens, a difference which is doubtless sexual. In those skulls which are supposed to be of females, $\overline{\text{p.1}}$ is much lower and smaller, and in shape less completely caniniform than in the males. The other premolars in all the available specimens are so abraded that the details of their construction cannot well be made out; they are longer in the antero-posterior direction than those of *Eporeodon*, and $\overline{\text{p.2}}$ is implanted by two well-separated fangs. In $\overline{\text{p.4}}$, which is less rapidly worn down than the other premolars, there are two deep internal valleys, one in front of and the other behind the deuteroconid; the posterior valley becomes, on abrasion, an isolated fossette.

The molars are much more like those of *Eporeodon* than those of *Merychyus* in the general shape of their broad, low crowns; but the valleys are narrow and soon disappear on wear, and the inner lobes are somewhat more flattened than in the John Day genus.

Measurements.

	MALE.	FEMALE.
	M.	M.
Upper molar-premolar series, length	.103	.101
Upper premolar series, length	.048	.048
Upper canine, antero-posterior diameter (fang)	.009	.008
Upper canine, transverse diameter (fang)	.012	.010
Upper first premolar, length	.010	.011
Upper second premolar, length	.013	.014
Upper third premolar, length	.013	.013
Upper fourth premolar, length	.012	.012
Upper fourth premolar, width	....	.014
Upper molar series, length	.055	.053
Upper first molar, length	.015	.012
Upper first molar, width	....	.015
Upper second molar, length	.018	.016
Upper second molar, width	....	.021
Upper third molar, length	.025	.024
Upper third molar, width	....	.025
Lower molar-premolar series, length	.107	.109
Lower premolar series, length	.048	.046
Lower first premolar, length	.010	.008
Lower first premolar, width	.009	.006

	MALE.	FEMALE.
	M.	M.
Lower second premolar, length	.013	.013
Lower third premolar, length	.013	.014
Lower fourth premolar, length	.015	.014
Lower molar series, length	.059	.064
Lower first molar, length	.014	.014
Lower second molar, length	.017	.018
Lower third molar, length	.028	.032

The *Milk Dentition* is like that of the older genera in that $\underline{\text{d.3}}$, which in *Merychyus* is molariform and composed of four crescents, is like neither molar nor premolar. The anterior half of the crown is a compressed protocone with trenchant edges, like the corresponding cusp in the premolars, but thicker transversely, and with a fossette upon its anterior face. Except for its greater thickness, this portion of the crown is like the whole of $\underline{\text{d.2}}$ or the corresponding premolar. The posterior part of the crown is composed of a pair of transversely placed crescents, the trito- and tetartocones, and resembles half of a molar. As I have elsewhere pointed out, with reference to the more ancient members of the family, this tooth plainly shows that in the upper milk molars the homologies of the cusps, as determined by their position, are the same as in the premolars, but the order in which these cusps appear is altogether peculiar, being as follows: proto-, trito-, tetarto- and deuterocones (No. 29, p. 441). In the lower series, $\overline{\text{d.2}}$ and $\overline{\text{d.3}}$ are like their successors in the permanent dentition, while $\overline{\text{d.4}}$ is of the usual artiodactyl pattern, consisting of three pairs of crescents; of these, the anterior pair is formed by the paraconid and an element internal to it, to which, as it occurs only among the artiodactyls, I have not thought it worth while to give a special name. I cannot determine whether $\underline{\text{p.1}}$ has a predecessor in the milk series, as it has in *Oreodon*, though there is some reason to think that this is the case. If so, the change takes place at an early period, before any of the other milk molars are shed. The milk canines and incisors differ from the permanent ones merely in size.

In short, the temporary dentition of *Mesoreodon* departs from that of *Merychyus* more widely than does the permanent one, though in this connection it should be remembered that the temporary teeth are not known in the earlier species of this genus, *M. zygomaticus* and *M. pariogonus*, and as these species have a permanent dentition which in one or the other respect recalls that of the older genera, it may well happen that the temporary dentition of these species will also prove to be intermediate between that of the typical *Merychyus* species from the upper Loup Fork and that of the more ancient forms of the family.

The Skull (Pl. IV, Fig. 32; Pl. V, Fig. 35). The structure of the skull is so like that in *Eporeodon* that no detailed description of it will be necessary, and it will therefore suffice to mention the points of difference between the two genera. The general proportions of the skull, length of face and cranium, size and position of the orbits, etc., are very similar in both; it is only when we come to compare the details that differences become apparent. In *Mesoreodon* the anterior aspect of the premaxillaries is slightly broader and more flattened, and the two bones are more closely applied together and the symphyseal portion is more thickened. These changes are very slight, but they are not unimportant, since they are in the direction of the curious ankylosed premaxillaries of *Merychyus*. The maxillary sinuses are enlarged, which gives to the face a slightly swollen appearance. As in the older genera of the family, there appears to be a sexual difference in the lachrymal depression, the depth of which varies with the size of the canines, indicating that it was better marked in the males, but it is never so deep as in the males of *Eporeodon*. The frontal sinuses are more inflated than in the John Day genus, which gives to the forehead somewhat the same vaulted appearance as in *Merychyus*, but to a less degree; the nasal processes of the frontals are unusually long.

The zygomatic process of the squamosal is intermediate in character between that of *Eporeodon* and that of *Merychyus zygomaticus;* it is very widely expanded at the base, both transversely and antero-posteriorly, and its outer border is quite strongly raised, thickened and rugose, more so than in the former, less so than in the latter. The postglenoid process resembles that in the John Day form in being low, broad and very massive. The tympanic bullæ vary in size, being in some specimens much more prominent and inflated than in others. So far as the material in hand goes, it appears to indicate that the bullæ were more largely inflated in the male than in the female, but a much larger series of skulls will be required to definitely determine whether this is really a sexual character or not. The occiput is peculiar, and in its upper portion very similar to that of *Eporeodon*, the angles being extended into a pair of large wing-like processes as in that genus and in some species of *Oreodon* as well. These prominent processes are separated by a deep concavity; beneath this the surface is transversely very convex, prominent in the median line, and with deep grooves or narrow fossæ at the sutures between the squamosals and the exoccipitals. The wide transverse expansion of the latter elements makes the base of the occiput very broad. The paroccipitals are likewise broad at the base and closely applied to the bullæ, but the distal portion is slender and tapering. In these respects the inferior portion of the occiput is intermediate in structure and appearance between that of *Eporeodon* and that of *Merychyus zygomaticus*. As in the latter, the condyles project more posteriorly than in the John Day form.

The mandible is most like that of *Eporeodon*, but with some changes in the direction of *Merychyus*. Owing to the procumbency of the incisors and their alveoli, the outline of the chin, when viewed from the side, is seen to be strongly concave. In *Eporeodon* the posterior margin of the angle and ascending ramus is regularly rounded and projects far back of the condyle, while in *Merychyus zygomaticus* this margin is nearly straight and vertically directed and extends but little back of the condyle, from which it is separated by a notch. In *Mesoreodon* the shape of this region of the mandible is intermediate between these two extremes. The coronoid is short and slender, the sigmoid notch deep and widely open, and the condyle is much extended transversely.

By a happy accident the hyoid (Pl. III, Fig. 29) is preserved almost intact in one of the specimens and in its natural position. This apparatus in some respects differs from that of any known artiodactyl and agrees better with the hyoid of certain perissodactyls. No doubt can exist as to the proper reference of the specimen, as is demonstrated by its connection with the skull, which was that of a large male, as indicated by the robust canines.

The tympano-hyal is a short, stout, cylindrical bar, which is inserted into a depression upon the outer side of the auditory bulla. The stylohyal forms a long and broad (antero-posteriorly) but thin and very much compressed bar, which expands at the proximal end, but this portion is fractured, so that its exact shape cannot be determined. Except for this proximal expansion, the bone is of almost uniform size throughout. The epihyal is well ossified and relatively longer than in the sheep; it is narrower and somewhat thicker than the stylohyal and tapers distally. The ceratohyal is also better developed than in the modern ruminants; it is of a curious, paddle-like shape, slender and rounded where it joins the epihyal and expanding into a rounded blade posteriorly, where it is applied to the basihyal; it is not ankylosed with the latter. The basihyal is unlike that of any artiodactyl, with which I have been able to compare it, and much more resembles that of the horse. In shape it is narrow, depressed and thin and curved backward; *i. e.*, with the concavity towards the front. Its great peculiarity, for an artiodactyl, consists in the presence of a glossohyal process, which is given off from the middle line of the hinder border. This process is much shorter proportionately and more curved backward than in the horse, and is compressed antero-posteriorly instead of laterally. I can find no other artiodactyl in which this process occurs. The thyrohyals are ankylosed with the basihyal, at which points they form slight, club-shaped swellings; they are slender, rounded, arched somewhat anteriorly and are of unusual relative length, being nearly as long as the stylohyals, though of altogether different shape.

Posterior to the hyoid apparatus, but not directly connected with it, the matrix contains a hollow, compressed semicylinder, or spout-shaped piece of bone (Fig. 29, *T. c.*), with exceedingly thin walls, which, strange to say, is unmistakably the ossified thyroid cartilage of the larynx. The position and, still more, the shape of this bone do not admit of the least doubt as to its nature, and this is one more added to the many peculiarities of this very peculiar family, though whether the character is confined to the present genus or is common to many other members of the group is not known as yet. Obviously, only by the rarest chance could such a fragile structure be preserved. Possibly the ossification of this cartilage is a sexual character, for, as already mentioned, the skull with which the specimen was found associated is very probably that of a male. The function of this bone was probably similar to that performed by the enormously inflated basihyal of the howling monkeys, and must have given to these animals most unusual powers of voice. So far as I can discover, such ossification is not known elsewhere among the Mammalia.

There is no available material to compare the hyoid apparatus here described with that of the other genera of the family, since these bones are but rarely found in a fossil state. One specimen of *Eporeodon* from Oregon shows, however, that the stylohyal in this genus resembles in size and shape that of *Mesoreodon*.

Measurements.

	MALE.	FEMALE.
	M.	M.
Length of skull from summit of occiput to end of nose	.252	.248
Length from occipital condyles to incisive alveoli	.232	.234
Distance from summit of inion to base of lower jaw (vertical)	.180	.187
Length of cranium from summit of inion to postorbital margin	.135	.133
Length of face from postorbital margin to end of nose	.126	.126
Height of occiput	.085	.078
Breadth of the same at base	.070	.070
Breadth of skull at zygomatic arches	.142	.142
Breadth of skull at postorbital arches	.110	.12
Breadth of face at upper first premolars	.049	.047
Breadth of face at last molars	.080	.085
Length of parietal crest	.098	.089
Length of frontals in median line	.050	.058
Length of nasals in median line	.100	.100
Breadth of face between frontal angular processes	.029	.033
Vertical diameter of orbit	.030	.039
Transverse diameter	.030	.030
Height of lower jaw at coronoid process	.096	....
Height of lower jaw at condyle	.090	.095
Height of lower jaw back of last molar	.049	.053
Height of lower jaw at third premolar	.031	.034

	MALE.	FEMALE.
	M.	M.
Breadth of lower jaw obliquely back of last molar	.073	.075
Length of symphysis of lower jaw	....	.052
Height of anterior nares	.035	.032
Breadth of anterior nares	.026	.032
Distance between the supraorbital foramina	.016	.024
Distance between the infraorbital foramina	.056	.060
Length of hard palate	....	.126
Width of hard palate between first molars	....	.045
Stylohyal, length	?.050	....
Epihyal, length	.015	....
Ceratohyal, length	.019	....
Basihyal, width	.018	....
Thyrohyal, length	.040	....
Thyroid cartilage, height	.016	....

The Brain. Having no brain-cast of the John Day genus *Eporeodon* prepared, I am unable to compare that of *Mesoreodon* with it, and must therefore take the White River *Oreodon* as a standard. In the latter genus there is a considerable degree of individual variation, both in the shape of the hemispheres and in the number and extent of their convolutions. To some of these types the brain of *Mesoreodon* presents a much closer resemblance than to others, but is somewhat more advanced and modernized than any of them. This advance is noticeable in the general form of the hemispheres, which, though not broader behind than in some specimens of *Oreodon*, are much more so anteriorly, and thus the whole brain is fuller, more rounded and tapers less forward. The hemispheres have also slightly increased in vertical diameter, so that they are no longer exceeded in this dimension by the height of the cerebellum and medulla oblongata. Posteriorly, the two halves of the cerebrum are brought closer together and reach the cerebellum in the middle line, not gaping so as to expose part of the optic lobes, as is the case in the White River genus. They do not, however, appear to overlap the lateral lobes any more extensively than in that form.

The sulci are very nearly the same as occur in some specimens of *Oreodon*, but they pursue a slightly more sinuous course, which gives an appearance of richer convolutions. The dorsal surface displays (1) a short and straight lateral fissure, which does not connect anteriorly with the suprasylvian, as is sometimes the case in the White River genus. As regards the latter, Krueg (No. 22) regards this sulcus as the splenial, which by an extreme degree of "supination" is exposed upon the dorsal surface of the cerebrum, as in many of the small artiodactyls now living. But as this fissure does not extend to the medial surface of the hemisphere, this interpretation does not seem probable. (2) There is a longer and more curved suprasylvian fissure, which is connected anteriorly with the coronal fissure by means of a short and faintly marked ansate sulcus. This connection is also found in some specimens of *Oreodon*. (3) The coronal sulcus consists of two portions; the anterior is longer and curves downward and outward, while the posterior is shorter and more obscurely marked and converges towards the middle line in a way that suggests the crucial sulcus of the Carnivora. The lateral view shows, in addition to these fissures, a short and nearly horizontal sylvian sulcus and a presylvian which has a more nearly vertical course than in *Oreodon*. The sylvian fissure appears to be connected with the fissura rhinalis, though in this region the sulci are very obscure and difficult to interpret. Indications of a posterior suprasylvian sulcus are also to be observed.

The character of the cerebral sulci is, it is obvious, very much the same as that which occurs among the smaller and more primitive forms of existing ruminants, and these, as Krueg has shown, agree closely in fundamental plan with the Carnivora. As there is every reason to believe that the *Oreodontidæ* are connected with the Pecora only through very ancient forms, in which the hemispheres were either smooth or but very little convoluted, this resemblance must be chiefly ascribed to parallelism of development. Still more obviously is this the case with regard to the likeness between these artiodactyls and the Carnivora.

In both of the brain-casts of *Mesoreodon* the olfactory lobes are broken away, but it is plain that they were not at all overlapped by the cerebrum. The cerebellum is very much as in the older White River type; its posterior face rises nearly vertically from the medulla; the vermis is large and prominent and the lateral lobes are broad. In neither of the specimens is the cerebellum sufficiently well preserved to display the details of the convolutions.

The Vertebral Column. The atlas is rather more like that of the true ruminants than is that of *Eporeodon*. This is due principally to the more uniform width of the transverse processes and their continuation into short spines behind the surfaces for the axis, from which they are separated by decided notches. This prolongation of the transverse processes is, however, much less marked than in the Pecora. On the other hand, the processes are more widely expanded laterally than in *Eporeodon*, which is a departure from the ruminant type. The anterior extension of the transverse process has, as in the earlier genera of the family, converted the atlanteo-diapophyseal notch into a foramen, but there is no perforation for the vertebrarterial canal. The anterior cotyli for the occipital condyles are deep and are more distinctly separated at their inferior borders than in *Eporeodon* and the neural spine is larger and more rugose. The posterior articular surfaces for the axis are larger in both dimensions than in the latter genus, but especially in width.

The axis is very different from that of the Oregon genus. The atlanteal facets are broader and higher, descending more below the level of the centrum and separated by a more decided medio-inferior notch, but not, as is the case in *Eporeodon*, divided above by deep notches from the bases of the pedicels of the neural arch. The odontoid process is wider, more depressed and spout-like, with more elevated margins and with the articular surface for the inferior arch of the atlas rising higher upon its sides. The odontoid process is thus in an analogous stage towards the assumption of the spout-like character as it is in *Protolabis* among the camels and *Miohippus* among the horses. The transverse processes are longer and heavier than in *Eporeodon.* The neural spine is of very different shape from that of the latter, a change which is chiefly brought about by an elevation of the anterior portion, so that it forms a large hatchet-like plate, quite different from the spine found in the other members of the subfamily and more like that of *Agriochœrus.* The postzygapophyses are more horizontal in position than in the Oregon genus, presenting more directly downward and less obliquely outward and backward. The pedicels of the neural arch are not perforated for the second pair of spinal nerves.

The remaining cervicals are rather short, with slightly opisthocœlous centra, which are keeled on the inferior side. The transverse process and pleurapophyseal plate are well developed and the latter reaches great size on the sixth vertebra. The neural spine is a mere ridge on the third, fourth and fifth cervicals, on the sixth it is much higher, slender and inclined forward, while on the seventh it is still higher and heavier. In proportion to the size of the head, the neck is of about the same length as in *Eporeodon*, but the vertebræ are more heavily built.

The thoracic vertebræ are not different in any very important respect from those of the Oregon genus, except for the better development of the spines. On the first of the series the spine is considerably higher and thicker than on the last cervical, but is much surpassed in both respects by the spine of the second, in which this process reaches almost bovine proportions. The other anterior thoracic vertebræ have broad, compressed spines, though none of the specimens are sufficiently complete to allow a determination of the length of these processes.

The remaining regions of the vertebral column are represented by numbers of isolated centra, from which the processes have been broken away, and which therefore do not require any detailed description. So far as they go, these bones differ but little from the corresponding vertebræ of *Eporeodon.*

The anterior ribs are rather short, broad and compressed, and of triangular section; posteriorly, they become longer, much more slender and of more rounded section. Nothing is known of the sternum.

The *Fore Limb* displays some characters of unexpected interest. The scapula varies considerably in the different specimens, some of which variations would appear to be of a sexual nature.

The best preserved shoulder-blade (Pl. IV, Fig. 33) is one which belonged, as I believe, to a female, being associated with a skull in which the small size of the canines and the caniniform first lower premolar is very striking. In this specimen the coracoid and suprascapular borders are broken in such a way as to prevent an accurate determination of the outline of the bone, but the spine, neck, and most of the postscapular fossa are in good condition. The glenoid cavity is small, shallow, and of nearly circular shape, the antero-posterior diameter but slightly exceeding the transverse. The coracoid is large, especially in the vertical dimension, but is not clearly demarcated from the neck of the scapula and displays but little rugosity; hence it is not conspicuous when viewed from the outer side. The neck of the scapula is high in the vertical direction, narrow and contracted, and the rugose lines for muscular attachment are but faintly marked. Above the neck, the glenoid border extends obliquely upward and backward, enclosing with the spine a narrow, triangular postscapular fossa. This border is considerably thickened and its external margin is elevated, making the fossa quite concave antero-posteriorly. The spine is very high, and for most of its length curved backward, so as to make the anterior surface convex and the posterior concave. Its free margin is flattened and gradually becomes wider inferiorly to the point where it sends out a distinct metacromial process. No other genus of the family has yet been found in which a metacromion occurs. Beneath this process the curvature of the spine is reversed, the posterior surface now being convex and the anterior concave, and the acromion projects forward as well as downward. The length of the acromion cannot be definitely stated, as its tip is broken away, but obviously it could not have descended nearly to the level of the glenoid cavity.

This spine is of a very exceptional character for an artiodactyl. In *Oreodon* there is no metacromion, the spine is lower and not recurved and descends more nearly to the level of the glenoid cavity. In *Eporeodon* there is likewise no metacromion, but the spine is very high and curved in very much the same fashion as in *Mesoreodon*.

The second specimen (Pl. IV, Fig. 34) has lost the spine but preserved the entire outline of the scapula, which is represented either by bone or by the impression of it in the matrix. There is good reason to believe that this specimen should be referred to the same individual as a large male skull which was found in the same locality, but on this point I cannot speak with entire confidence. The glenoid cavity is somewhat larger and more oval in shape than in the specimen first described, the antero-posterior diameter distinctly exceeding the transverse; the neck is broader, heavier and less contracted, and has well-marked rugose lines for the attachment of muscles. On the other hand, the glenoid border is less elevated and the postscapular fossa is, in consequence, less concave. The coracoid border curves forward much more decidedly than it does in the scapula of *Oreodon*, making the proximal portion of the blade relatively much wider than in that genus. The suprascapular border is gently arched, but nevertheless forms nearly a right angle with the glenoid border. The spine is almost median in position, giving pre- and postscapular fossæ of nearly equal size, but of different shape, owing to the different course taken by the coracoid and glenoid borders.

The block of matrix which contains the scapula just described, holds also the last four cervical and first four thoracic vertebræ, with their ribs attached, and the proximal half of the humerus. The same block contains also a small bone (Fig. 34, *cl*) which is removed but a short distance from the coracoid process of the scapula, and runs forward and inward, overlapping the first rib and the transverse process of the seventh cervical vertebra. *This bone I regard as a rudimentary clavicle.* Naturally, such identification will be received with much doubt, and I was at first very skeptical about it myself. It is certainly most unexpected to find this element in an ungulate so far advanced in differentiation and so high in the geological scale as the middle Miocene, while it has not yet been detected in the Condylarthra of the lower Eocene. Nevertheless, in spite of the *à priori* improbability of the occurrence of the clavicle in a Miocene artiodactyl, there seems to be but little doubt that such is actually the fact. In the first place, the position taken by the bone in question is such as a clavicle would occupy if it were present. There is a slight vertical displacement of the whole fore limb and shoulder girdle, but otherwise the bones of all the surrounding parts—vertebræ, ribs, scapula and humerus—are in their natural position almost as perfectly as in a living animal. (2) There is no other bone in this skeleton with which this one can be identified; it is much too slender to be a part even of the smallest rib, and its shape is quite different from that of any of the elements of the hyoid apparatus. Fortunately, we already possess the latter belonging to (presumably) the same individual and can definitely state that the bone in question cannot be referred to it. (3) The shape is that which we should expect to find in a rudimentary clavicle; it is slightly arched downward, is very slender and of rounded section, with an inferior keel, which is best marked in the middle and dies away towards the ends. (4) The unusual development of the spine of the scapula is an indication that the clavicle had not been entirely lost. (5) Wincza's observation (No. 36) that a transitory rudiment of a bony clavicle is developed in the sheep, points to the conclusion that this element has not been eliminated from the artiodactyls for so long a period as has been generally supposed. (6) Admitting that the structure under discussion really represents the clavicle, its very small size and loose attachments (for it is in contact with neither the scapula nor the sternum) will explain why it has not yet been observed in the more ancient forms of ungulates. Only by the rarest chance could such a bone be preserved in its natural position.

Unless, therefore, we are prepared to assume that a single bone of some small animal has become accidentally entangled with this skeleton of *Mesoreodon*, and in such a way as to exactly simulate the position of the collar bone, which is certainly highly improbable, there would seem to be no escape from the conclusion that the clavicle was present in this genus. However, other specimens will be required before we can be entirely satisfied on this point.

In this connection it may be noted that the simpler and less developed scapular spine of *Oreodon* would lead us to infer the absence of a clavicle in that genus. But, assuming this to be the case, we cannot yet determine the significance of the fact since so little is known of the skeleton of those White River species in which the tympanic bullæ are inflated and which are presumably the ancestors of *Eporeodon*. In the absence of knowledge on this point we cannot tell whether the supposed clavicle of *Mesoreodon* should be regarded as a persistent rudiment or as a case of reversion and the reacquisition of a lost structure. The former alternative would certainly seem to be more probable, and, if it is true, it may serve to explain the very general difference between artiodactyls and perissodactyls with regard to the development of the acromion. As is well known, this structure is in nearly all artiodactyls large and prominent, while in even the Eocene perissodactyls the acromion is absent. If we may assume that the clavicle persisted longer in the former group than in the latter, this difference would be accounted for.

The humerus (Pl. IV, Fig. 34; Pl. V, Fig. 37) is in general very similar to that of *Eporeodon*, but has a decidedly stouter shaft; the head is more convex and presents much more posteriorly, less exclusively in the proximal direction. The external tuberosity is of a different shape, its extremities being less produced as overhanging hooks; the internal tuberosity is also less developed, and in consequence the bicipital groove is not so deep. The length of the shaft is about the same as in *Eporeodon*, but the diameter, both transversely and antero-posteriorly, is much greater. The distal end is of the shape which is characteristic and constant throughout the family.

This shape is already well shown in the White River species and is marked by its relatively great transverse breadth, prominent internal epicondyle, broad, rounded intercondylar ridge, which is nearly median in position, and the nearly equal width of the external and internal divisions of the trochlea. The anconeal fossa is relatively higher and narrower than in *Eporeodon*.

Some differences, which are probably of a sexual nature, are to be observed in the proximal end of the humerus in different specimens. In those which are associated with the skulls marked by small canines, and therefore presumably female, the head is more hemispherical and markedly shorter in the antero-posterior direction; the external tuberosity extends less completely across the anterior face of the bone and the bicipital groove is wider. Possibly, however, these distinctions are specific rather than sexual.

The ulna and radius (Pl. V, Fig. 38) are massively constructed; they are entirely unreduced and show no tendency to coössify at any point. The radio-ulnar arch is very long, extending from a short distance below the head to the distal expansion; this is not visible in the anterior view. The radius has the form of head which is characteristic of the family and therefore requires no detailed description. The shaft is not so broad and antero-posteriorly compressed as in *Eporeodon*, but more rounded and cylindrical in the middle, reverting thus in some degree to the condition found in *Oreodon*. The distal end is more expanded transversely than in *Eporeodon*, though in this respect there is considerable variation. The scaphoid surface is peculiar in the deep groove on its ulnar border. This is already indicated in the Oregon genus, but to a much less conspicuous degree, especially in the breadth and depth of the groove behind. A similar groove appears in *Merychyus*. The lunar facet is like that of *Eporeodon*, but is less closely connected with the scaphoid facet.

The ulna is quite unreduced and has a very heavy shaft, which almost equals that of the radius in antero-posterior thickness and exceeds it in width. The olecranon is high and massive. The distal end is excavated to receive the expansion of the radius and carries a facet for the cuneiform, which is narrow antero-posteriorly but broad transversely. This ulna differs but slightly and in no important respect from that of *Eporeodon*.

The manus (Pl. V, Figs. 39, 40) presents some features of much interest, as here we find most strongly emphasized the tendency towards *Merychyus* which is more obscurely indicated in the structure of the skull and teeth. In the carpus the scaphoid has undergone some noteworthy changes as compared with that of the more ancient genera. It is increased in size, especially in breadth; the radial surface is, as usual, concave behind and convex in front, but rises more towards the ulnar border to enter the groove on the radius already mentioned. The ulnar side of the scaphoid is concave and is chiefly occupied by the large inferior facet for the lunar. The distal side is taken up by two facets, those for the magnum and trapezoid respectively. The magnum facet is the larger of the two and is deeply excavated behind, but descends abruptly in front. The lunar is both high and broad; its radial surface is saddle-shaped, concave from side to side and convex fore and aft, broad in front, much contracted and tapering behind. The radial side carries two facets for the scaphoid, the upper one small and nearly plane, the lower very large and convex and separated from the magnum surface by a scarcely perceptible ridge. The latter facet is almost entirely lateral, except on the palmar border, where it is reflected underneath so as to be partly distal. The unciform facet is concave and obliquely placed; it forms with the magnum surface a sharp beak, which is wedged in between the magnum and the unciform and extends nearly to the third metacarpal.

The cuneiform is broad and low and has a less dorso-palmar diameter than the other proximal carpals. The ulnar surface is a narrow groove which is reflected down upon the external side of the bone, and the pisiform facet forms a broad band upon the palmar side which is continuous with the ulnar facet. Distally, the cuneiform displays a simply concave facet for the unciform. The pisiform is intermediate in character between the condition found in the earlier and that in the later genera of the family, being more expanded at the free end than in the former, less so than in the latter. The proximal end is much contracted and bears a single rounded articular surface, part of which is for the ulna and part for the cuneiform.

The trapezium is a small nodular bone which has but two facets, one for the trapezoid and, at an obtuse angle with this, another for the second metacarpal. This species and *Merycochœrus montanus* are the only members of the family in which I have succeeded in obtaining the trapezium, though the facets on the neighboring bones leave no room for doubt as to its presence in the other genera as well. This carpal enables us to state with entire confidence that in *Mesoreodon* the pollex is not represented even by a rudiment. The trapezoid is a large bone both vertically and transversely, but it has no great antero-posterior depth; proximally, it bears a large and simply convex facet for the scaphoid and its radial side is occupied by a concave surface for the trapezium. Distally, there are two facets, one of which is large and slightly concave, the other small, plane and inclined at an open angle to the first; the former is the surface for the second metacarpal and the latter for the third.

The magnum is a very characteristic bone, resembling strongly that of *Merychyus* and *Merycochœrus*, though its peculiarities are not carried to such an extreme. Seen from the front, the magnum appears to be smaller than the trapezoid, and is both lower and narrower, but its upper surface rises rapidly towards the palmar side, forming the "head." Behind the anterior face the bone is deeply constricted by two concave facets, one on the radial side for the trapezoid and the other on the ulnar side for the lunar. The trapezoid and magnum are very closely interlocked and form a continuous saddle-shaped surface for the scaphoid, which in appearance resembles the astragalar trochlea of a carnivore. The magnum, including even the head, is entirely beneath the scaphoid, the opposite condition to that of the horse, in which the head is entirely underneath the lunar, though the scaphoid rests upon the anterior portion. The lunar surface is deeply concave (though less so than in *Merychyus* and *Merycochœrus*, in which it describes a semicircle) and almost entirely lateral in position, but on the palmar side is a small, shelf-like projection which extends somewhat beneath the lunar. This gradual displacement of the magnum towards the radial side of the carpus is already indicated in the oldest known genus of the family, *Protoreodon*, and is more decidedly marked in *Oreodon* and *Eporeodon*, though even in the latter it has by no means been carried to the same extent as in *Mesoreodon*, in which it attains almost the extreme position found in *Merychyus* and *Merycochœrus*. The contact between the magnum and the unciform is very slight and nearly or quite limited to the posterior or palmar margin, the two bones being separated by the long beak of the lunar and the strong process which the third metacarpal sends obliquely upward and outward to abut against the unciform. Distally, the magnum bears a single saddle-shaped facet for mc. iii, which is reflected upward more upon the ulnar than on the radial side. This facet is elongate and quite deeply concave in the dorso-palmar direction, contracting to a point behind, narrow and very convex transversely. There is no facet for mc. ii, that bone being excluded from contact with the magnum by the connection of mc. iii with the trapezoid. The posterior hook of the magnum is short, curved, blunt, depressed and curved towards the radial side. The unciform is high and broad, with its proximal portion contracting posteriorly. The upper surface bears an oblique facet for the lunar, which rests almost entirely upon the unciform, and somewhat larger convex facet for the cuneiform. The metacarpal surfaces form a nearly continuous curve. On the radial side, though confined to the dorsal half of the bone, is a large oblique facet for the projection from mc. iii; distally, there is a larger facet for mc. iv and a smaller one for mc. v; the latter surface is reflected up upon the ulnar side of the unciform.

The metacarpals are four in number and in their proportions very similar to those of the older genera, *Oreodon* and *Eporeodon*, though differing in some important respects from the metacarpals of those genera in their mode of articulation with the carpus, which is like that of *Merycochœrus* and *Merychyus* in being of the "adaptive" type. In the second species of *Mesoreodon*, *M. intermedius*, to be described hereafter, the proportions of the metacarpals are more like those of *Merychyus*.

The second metacarpal is short and slender, with a trihedral recurved shaft; the head is rather broad and bears a triangular, nearly plane facet for the trapezoid and a postero-internal one for the trapezium. This bone does not reach the magnum, which constitutes an important difference from the manus of *Eporeodon*, in which, as in the more ancient genera, mc. ii is in contact with the magnum. The third metacarpal is likewise different from that of the last-named genus; the head is expanded and deeply concave transversely and convex antero-posteriorly; on the radial side is a very small oblique facet for the trapezoid and on the ulnar side a very large one for the unciform. Both of these surfaces are confined to the anterior half of the metacarpal. Beneath the unciform projection on the head of mc. iii the bone is excavated to receive the head of mc. iv; posterior to this, and separated from it by a deep sulcus, is a second facet placed on a projection, which extends towards the ulnar side. This facet is somewhat oblique and extends *beneath* the head of mc. iv and the two bones are thus interlocked in a very complex and perfect manner. The same arrangement is indicated in *Oreodon*, but in this genus the posterior facet is much less conspicuously developed. In the present species, the shafts of mc. iii and mc. iv are quite heavy and not very long, in which respect they differ very markedly from those of the second species, *M. intermedius*. In *Oreodon*, mc. iii not only rises above mc. iv but also extends below it distally, while in *Mesoreodon*, as in *Merychyus*, mc. iv extends slightly below the end of mc. iii, though it is considerably the shorter of the two. Proportionately, mc. iv is little, if any, longer in *Mesoreodon* than in the White River genus, the different disposition of the metacarpals being due to the enlarged unciform process of mc. iii, the greater relative height of the unciform, and the consequent downward displacement of the head of mc. iv.

The fifth metacarpal is quite different from that of *Oreodon* in having a narrower but deeper head, with the shaft broader proximally, expanding less distally and being more strongly recurved. In length and thickness it is the counterpart of mc. ii, whereas in the White River genus the latter is decidedly stouter. On all of the metacarpals the distal carinæ are much better developed than in *Oreodon* and are plainly visible when the manus is viewed from the front.

The phalanges of the proximal row are like those of the earlier genera of the family, except that they are relatively shorter. Those of the second row are notably shortened and broadened; the distal trochlea is wider and not reflected so far upon the dorsal side of the bone, but is more prominent upon the palmar side. The ungual phalanges of this species are very peculiar and different from those of any other member of the family. They are wide proximally and taper distally to a point, which is more acute than in the other genera; in the median pair (digits iii and iv) the approximate borders are straight and the opposed borders curve distally towards the median line. Proximally, the ungual has considerable vertical depth, but this diminishes rapidly towards the distal point, and the dorsal surface is very convex and strongly arched from side to side. The unguals of the lateral digits are like those of the median pair, except for their very much smaller size. In brief, the ungual phalanx is shaped like the half of a slender and somewhat irregular cone.

Measurements.

	MALE.		FEMALE.
	M.		M.
Scapula, height	.138		?.140
Scapula, greatest width	.088		?.090
Scapula, width of neck	.023		.021
Glenoid cavity, antero-posterior diameter	.027		.022
Glenoid cavity, transverse diameter	.025		.022
Humerus, length	....		.151
Humerus, antero-posterior diameter of proximal end	.056		.049
Humerus, transverse diameter of proximal end	.042		.039
Humerus, width of distal end	....		.039
Clavicle, length	?.027		....
Radius, length	....		.137
Radius, width of proximal end	....		.027
Radius, width of distal end	....		.029
Radius, width of shaft in middle	....		.014
Ulna, length	....		.180
Ulna, height of olecranon from sigmoid notch	....		.030
Ulna, breadth of shaft in middle	....		.016
Ulna, breadth of distal end	....		.014
Scaphoid, height		.016	
Scaphoid, width of proximal end		.012	
Lunar, height		.017	
Lunar, width of proximal end		.012	
Pisiform, length		.023	
Metacarpal ii, length		.054	
Metacarpal iii, length (not including unciform process)		.065	
Metacarpal iii, width of proximal end		.016	
Metacarpal iii, width of distal end		.014	
Metacarpal iii, width of shaft below head		.013	
Metacarpal iv, length		.061	
Metacarpal iv, width of proximal end		.013	
Metacarpal iv, width of distal end		.012	
Metacarpal iv, width of shaft below head		.012	
Metacarpal v, length		.052	
First phalanx of third digit, length		.021	

Second phalanx of third digit, length	.013
Third phalanx of third digit, length	.017
Third phalanx of third digit, width of proximal end	.009

The Hind Limb presents fewer peculiarities than the fore limb, and, except in a few details, is very similar to that of *Eporeodon.* The pelvis (Pl. VI, Figs. 46, 47) is very like that of the Oregon form but with some minor differences. The ilium has a shorter peduncle which expands more abruptly into a wider plate. The latter is less strongly everted, especially at the antero-inferior angle, which is less prolonged. The iliac surface is broader and more rounded, the acetabular border less prominent, and the pubic border more so. The pit for the rectus femoris muscle is larger but not so deep. The acetabulum is much larger and relatively shallower and the articular surface is more reduced by the very large sulcus for the round ligament. The ischium is more twisted upon itself, so that the posterior end is much more everted and depressed. The crest above the acetabulum descends more abruptly in front and dies away behind without forming an ischiadic notch. The pubis in its free portion is short and stout and the symphysis, in which the ischium shares, is elongate.

The femur shows analogous differences from that of *Eporeodon.* The head is distinctly larger and more sessile and has an unusually anterior position; it does not rise so far above the bridge connecting it with the great trochanter. This bridge is more thickened in the antero-posterior dimension and the great trochanter is larger and more massive. The shaft is heavier and more arched forward and, distally, is both broader and deeper. The external linea aspera appears to be less conspicuously marked and the pit for the plantaris muscle shallower. The condyles have a greater vertical diameter but do not present so strongly backward. The rotular trochlea is wider; its margins are of equal height and more compressed.

The tibia is very much alike in the two genera. In *Mesoreodon* the external surface for the femoral condyle is broader and the cnemial crest more massive and rugose; the shaft is slightly heavier and the distal end rather more expanded, both transversely and from before backward. The grooves for the astragalus are wider and the intercondylar ridge broader and lower and not forming, as in *Merychyus,* a posterior tongue. The sulcus which invades the external astragalar groove is larger and deeper, and the external groove is a little wider relatively to the internal than in *Eporeodon.* An important change which is already indicated in the Oregon genus is carried farther in *Mesoreodon,* viz., the presence of a *distal* facet for the fibula, showing that the latter has extended slightly beneath the tibia. I cannot ascertain the condition of the older species of *Merychyus* in this respect, but in a specimen belonging probably to *M. elegans,* from the upper Loup Fork, there is no fibular facet on the distal surface of the tibia and the surface on the external side is much larger and more deeply impressed.

The distal end of the fibula is preserved in one specimen; it forms a very large and heavy external malleolus which is especially expanded antero-posteriorly; on the distal side is a very long facet for the calcaneum, with the outer border somewhat elevated. On its inner surface the malleolus displays a projection which extends beneath the facet already described on the distal aspect of the tibia. The shaft was obviously reduced to the most slender proportions, though we cannot determine whether it was interrupted or entire.

The pes (Pl. V, Figs. 41, 42) requires but a brief description, as it departs very little from the type common to nearly all the members of the family, there being less variation in the structure of the hind foot than of the front. The calcaneum has a long and stout tuber, with nearly parallel borders, and thickens at the free end into a heavy knob; the fibular facet is low but very long, in which respect it differs strikingly from that of *Merycoidodon.* The distal astragalar facet is very long, but, as in nearly all the genera of this family, the sustentaculum projects but very little. The cuboidal surface is narrow but long, measured from the dorsal to the plantar edge.

The astragalus is low and broad; the outer proximal condyle exceeds the inner considerably in size, but less than in *Oreodon*, and is invaded by a larger sulcus; it has a more thickened and gently rounded external border than in that genus and the intercondylar groove is wider and less angulate. The navicular surface is very different from that of the White River genus, extending higher up upon the anterior face of the bone and having decidedly greater dorso-plantar thickness. Corresponding to the structure of the calcaneum, the sustentacular surface is long, narrow, and not connected with other facets. The cuboid, compared with that of the earlier genera, has increased in relative height, which gives it an appearance quite like that of *Merychyus*, though it has not attained such an extreme; the calcaneal facet differs from that of *Merychyus* and resembles that of *Oreodon* in being incised lower down upon the anterior face of the cuboid. The navicular has undergone no important changes, unless the greater elevation of its antero-external border be so regarded; the posterior hook is very long. The cuneiforms are very much as in the older genera. As in all the members of the family, the ecto- and mesocuneiforms are coössified, the compound bone differing from that of *Merychyus* (at least of such species as *M. elegans* and *M. arenarum*) in its much greater proportional transverse width.

The metatarsals resemble those of *Oreodon*, but some changes may be observed which point in the direction of *Merychyus.* Thus, the metatarsals are straighter, less arched forward and more slender in proportion to their length; the distal carinæ are more prominent and more extended upon the anterior face of the trochlea.

The phalanges (Pl. V, Fig. 42) of the pes are like those of the manus, except for their greater size, and the curious, trowel-shaped unguals have their peculiarities somewhat emphasized.

Measurements.

	M.
Diameter of acetabulum, fore and aft	.029
Diameter of acetabulum, vertical	.028
Width of pelvic opening at pubes	.059
Femur, length	.190
Femur, width of proximal end	.050
Femur, diameter of head, fore and aft	.025
Tibia, length	.177
Tibia, breadth of proximal end	.044
Tibia, breadth of distal end	.028
Astragalus, length	.035
Astragalus, width of proximal trochlea	.020
Calcaneum, length	.064
Cuboid, height	.020
Metatarsal iv, length	.075
Metatarsal iv, width of proximal end	.013
First phalanx of third digit, length	.022
First phalanx of third digit, width of proximal end	.013
Second phalanx of third digit, length	.012
Third phalanx of third digit, length	.016
Third phalanx of third digit, width of proximal end	.013

Mesoreodon intermedius Scott.

Amer. Naturalist, 1893, p. 661.

This species is represented by foot-bones belonging to two different individuals, which are so different in their proportions from those of the foregoing species that they must be referred to another animal. The only skull which can with any probability be regarded as belonging to *M. intermedius* is a small one belonging to a very immature individual and therefore of little value for systematic purposes. The milk teeth are still in place, the permanent canines just beginning to appear, and the first permanent upper molar already protruded. This latter tooth is somewhat like that of *Merychyus* in the shape of the external crescents and in the rapid narrowing of the valleys towards the base of the crown. The inner crescents, however, are not like those of the Loup Fork type.

One of the typical specimens (Pl. V, Fig. 43) consists of the third metacarpal entire and the proximal three-quarters of the fourth. As compared with those of the preceding species, these bones are decidedly longer and more slender, with the carinæ of the distal trochleæ more extended anteriorly. In their proportions and in their carpal facets these bones closely approximate those of *Merychyus*, though the trapezoid facet of mc. iii is smaller.

The second specimen (Pl. V, Fig. 44) consists of isolated phalanges. Those of the proximal row are much more slender and arched forward than in *M. chelonyx*. The unguals are extremely like those of *Merychyus*, but are somewhat more obtusely pointed.

Measurements.

	M.
Metacarpal iii, length	.069
Metacarpal iii, width of proximal end	.015
Metacarpal iii, width of distal end	.014
Metacarpal iii, width of shaft below head	.011
Metacarpal iv, width of proximal end	.013
Metacarpal iv, width of shaft below head	.011
First phalanx of third digit, length (pes)	.023
First phalanx of third digit, width of proximal end	.012
Third phalanx of third digit, length	.017
Third phalanx of third digit, width of proximal end	.008

MERYCHYUS Leidy.

Proc. Acad. Nat. Sci. Phila., 1858, p. 24.

MERYCHYUS ZYGOMATICUS Cope.

(Syn. *Ticholeptus zygomaticus* Cope, *Amer. Naturalist*, Vol. XII, p. 129.)

The type specimen of this species is a much crushed and distorted skull, of which, through the courtesy of Prof. Cope, I present a drawing (Pl. V, Fig. 45), corrected so far as is possible by the aid of other material. On comparing this skull with that of *Mesoreodon*, we are at once struck by the great increase in vertical height, both relative and actual, which it has undergone, the height measured vertically from the lower border of the mandible to the upper line of the forehead above the orbit being to the total length of the skull about as 7 : 11, while in *Mesoreodon* the height barely exceeds one-half of the length. The face has also become somewhat shortened and the cranium relatively longer. The orbits do not extend so nearly to the upper line of the skull, the forehead rising much more above them and is more convex, which appears to be due to a greater development of the frontal sinuses. The supraorbital ridges converge less rapidly, and the forehead is thus longer, higher and more arched, and the sagittal crest is shorter. The upper contour of the skull is more arched from before backward, and in all probability the great posterior wing-like prolongations of the parietals and supraoccipital are much reduced. The occipital condyles project much more strongly backward and somewhat more downward. The paroccipital processes are much wider, at least at the base, where they form broad, thin, antero-posteriorly compressed plates. The notch between the postglenoid and posttympanic processes of the squamosal is greatly widened, especially above; below, it is narrowed by the downward and forward course taken by the posttympanic. This change is accompanied by another in the position of the external auditory meatus, which is "directed posteriorly in a way quite peculiar, resembling somewhat the position seen in some of the hogs" (Cope).

The zygomatic process of the squamosal has a more massive and rugose external border and its posterior expansion is directed more horizontally and less vertically than in *Mesoreodon*, and in the latter respect this species departs considerably from the other species of *Merychyus*. In spite of this difference, there is a very suggestive resemblance between the present species and *Mesoreodon* in the appearance of the zygoma. The malar is heavier and has greater depth beneath the orbit. The maxillary has a shorter but much higher facial portion and the ridge which runs forward from the malar suture is much better marked. In the type specimen, the region about the infraorbital foramen is much injured, but there is some reason to think that the foramen is double, and a facial vacuity is obviously present, and though its shape and size cannot be accurately determined, it was probably small and fissure-like.

The premaxillaries are coössified and have their anterior faces much flattened; the ascending rami are much shorter than in *Mesoreodon* and the anterior nares lower and more obliquely inclined upward and backward. The muzzle is relatively broader, but the increase in height of the alveolar portion of the premaxillaries and in breadth of their ascending rami, contracts the narial opening, especially in its inferior portion, where it becomes very narrow.

The mandible is different from that of *Mesoreodon* in several important respects. The horizontal ramus is proportionately shorter, but of greater and more uniform vertical depth, tapering less anteriorly; the chin is straighter and less concave when seen in profile and the incisive alveolus less depressed and procumbent. As in *Mesoreodon*, the anterior mental foramen is placed beneath $\overline{\text{p. 3}}$, whether, as in that genus, there is a second foramen underneath $\overline{\text{m. 1}}$, the specimen is too much fissured to show with clearness, though this appears to be the case. The angle projects somewhat below the inferior border of the horizontal ramus and its posterior margin is more thickened and rugose; on the other hand, it projects more behind the condyle, from which it is separated by a more decidedly marked notch. The masseteric fossa is notably smaller and does not descend so low upon the side of the jaw.

The extreme fragility of the type specimen and the hardness of the cement-like matrix in which it is imbedded have prevented the complete exposure of the teeth, so that these can be studied only from the external side, and important questions as to the constitution of their crowns must be left undecided. In the other specimens of the species at my command, the teeth are so badly preserved as to be of no value in this connection. The first and second upper incisors are very small, the lateral much exceeding the others in size, and the second somewhat larger than the median. These teeth, except for the greater relative size of the lateral one, closely resemble the incisors of the immature skull mentioned above and referred doubtfully to *Mesoreodon intermedius.* The canine is of the type usual in the family. The premolars have increased in vertical, but diminished in antero-posterior diameter; their front and hind margins are nearly parallel and the acute apex in each tooth is in advance of the median vertical line of the crown. Thus the postero-inferior cutting border is longer than the antero-inferior. In *Mesoreodon* the apex is in the middle line and the inferior trenchant margins are of subequal length. The molars exhibit the same reduction in length (antero-posteriorly) and increase in height as do the premolars, and are almost as distinctly hypsodont as are the molars of the later species of *Merychyus* from the upper Loup Fork. The external pillars, especially the median one (mesostyle), are thin and compressed, but very prominent. The postero-external crescent is much more extended from before backward than the antero-external one, though the disproportion is less than in *Mesoreodon.*

The lower incisors are larger and, in particular, higher than the upper ones, and have compressed chisel-shaped crowns; the canine is broader than the incisors but has lost its typical shape. The caniniform first premolar calls for no remark, as it departs in no way from the shape common throughout the family. The second and third premolars resemble those of the upper jaw in their reduced length and increased height and in having their apices in front of the middle line of the crown. In $\overline{p.4}$ the heel (metaconid) is very distinctly separated from the protoconid, but is relatively smaller than in *Mesoreodon.* The lower molars are so concealed in the matrix that little can be made out with regard to them. As compared with the corresponding teeth of the older genus, they have shorter but much more decidedly hypsodont crowns.

Merychyus pariogonus? Cope.

Proceedings Amer. Philos. Soc., Vol. XXI, p. 542.

In the Princeton collection is the facial portion of a skull, which was found by Mr. Benet in the upper series of beds in the Deep River valley, and which clearly belongs to *Merychyus*. It may be provisionally referred to *M. pariogonus* Cope, though unfortunately a comparison with the type specimen is of little service, for the two skulls have almost nothing in common. In the type specimen, the cranium and molar teeth are preserved; in the specimen before us, only the face. The teeth are in such different stages of wear in the two specimens that they may or may not pertain to different species. Almost certainly it cannot be referred to *M. zygomaticus*, from the type of which it differs in its smaller size and less pronouncedly hypsodont dentition.

The incisors, canines and first premolar in the upper jaw are represented only by alveoli, but these show that the canine was rather slender and was followed with hardly an appreciable diastema by p. 1, which was implanted by two distinctly separated fangs, the anterior one of which is considerably larger than the posterior. The second premolar has almost plane external face, with no median ridge and only the faintest trace of a cingulum. The crown is so much abraded that only a small enamel invagination on the inner side of the tooth remains visible. So far as can be judged from its present worn condition, the construction of p. 3 is very much the same as that of p. 2, but with a more prominently developed deuterocone. As in the genus, and indeed the family, generally, p. 4 consists of two crescents; a difference from the species of the upper Loup Fork is to be found in the strongly developed internal cingulum.

The molars increase in size from m. 1 to m. 3; they appear to be as brachyodont as in the type specimen, though this may be due, in part at least, to their abraded condition. The external pillars (para- and mesostyles) are less prominent than in *M. zygomaticus.*

The face has not attained that great vertical depth in the region of the orbits which is characteristic of *M. zygomaticus;* the orbit is more oval in shape and more oblique in position than in that species and is notched superiorly; the forehead is more inflated by the sinuses. There are no supraciliary ridges, and the sagittal crest must have commenced at a point considerably farther back than its origin in *Mesoreodon.* The malar is not so heavy as in *M. zygomaticus,* and the masseter ridge is continued well forward upon the maxillary, which displays a slight facial depression above p. 2 and p. 3. The infraorbital foramen is double; the antero-superior foramen is above p. 3 and the postero-inferior opening above the space between p. 3 and p. 4. The lachrymal is large and has an extensive but not very deep depression. A facial vacuity was obviously present between the maxillary, lachrymal and frontal, but its size and shape cannot be determined, as none of the bones mentioned have complete margins and the nasals are entirely lost. The anterior nares are low, very much narrowed inferiorly and expanding into a transverse oval above. The premaxillaries have a high and broad alveolar portion which forms an abruptly truncated muzzle; the two bones are ankylosed at the symphysis. The ascending rami are short and have broad, flattened anterior faces. The palatine processes of the premaxillaries are very limited, while the incisive foramina are quite large and extensively emarginate the palatine plates of the maxillaries. The last-named processes are both long and broad and of nearly uniform width, the two series of teeth diverging but little posteriorly. The palatines are very large and form nearly half of the roof of the mouth. Transversely, they extend almost to the molar alveoli, and anteriorly they are carried as far as the middle of m. 1; they are of uniform width, except behind the molars, where they are constricted by the broad palatine notches. The posterior nares are not indicated in the specimen, but obviously they were placed far back, as the palatines are preserved for some distance behind the last molar.

Measurements.

	M.
Length of molar-premolar series	.084
Length of premolar series	.041
Length of p. 2	.010
Width of p. 2	.006
Length of p. 3	.011
Width of p. 3	.011
Length of p. 4	.009
Width of p. 4	.012
Length of true molar series	.043
Length of m. 1	.012
Width of m. 1	.012
Length of m. 2	.017
Width of m. 2	.013
Length of m. 3	.020
Width of m. 3	.014

MERYCOCHŒRUS Leidy.

Proceeds. Acad. Nat. Sci. Phila., 1858, p. 24.

The collection contains nothing from the lower Deep River beds which can be confidently referred to this genus, but there can be no doubt that they occur in those beds because of their abundance both in the John Day and in the Loup Fork. On the other hand, the upper strata of the Deep River valley yielded specimens of *Merycochœrus* in profusion. Among these specimens there is great variation in size, and other characters as well, so great as apparently to indicate more than one species, but the only one which can be definitely identified is the *M. montanus* Cope.

Merycochœrus montanus Cope.

Proceedings Amer. Philos. Soc., Vol. XXI, p. 531.

This species is one of the most abundant and characteristic forms of the upper beds and is represented in the collection by specimens which include nearly all parts of the skeleton, the only important structures which are absent being the scapula and pelvis.

The skull and dentition of this genus are well known, and for this species in particular have been very fully described by Cope. It will suffice, therefore, for our present purpose to give a brief summary of the more characteristic features of these structures, with especial attention paid to the numerous variations displayed by the various specimens.

As in the other members of the genus, the face is bent downward upon the basicranial axis and is much more elongate than in the other genera of the family, all of which are characterized by short faces, and in some this shortening is extreme. The brain-case, on the other hand, is relatively short and well rounded. The orbit is small and situated high in the face. The occiput is high and narrow above, though broader than in the other species of the genus in which this region of the skull is known, and becomes very wide at the base. Above the foramen magnum is a narrow but strong median convexity, which is bounded on each side by a deep fossa and which passes superiorly into the shallow concavity which is enclosed between the wing-like processes of the supraoccipital and parietals. The latter processes project much less strongly backward and more transversely than in the older genera of oreodonts or than in the John Day species of *Merycochœrus*. The occipital condyles do not project very strongly behind the plane of the paroccipital processes, though in this respect there appears to be considerable individual variation. The foramen magnum is unusually high and narrow. The paroccipital processes are very broad at the base, but long, tapering, slender, and antero-posteriorly compressed in the free portion. The tympanic bullæ are large, especially from before backward, extending anteriorly beyond the line of the postglenoid processes and nearly to that of the glenoid articular surfaces; between the tympanics the basioccipital is narrow and compressed and has a strong inferior keel. The squamosal forms most of the side wall of the cranium and sends off a massive zygomatic process, which, however, is not so heavy as in the John Day species, *M. macrostegus*. The different specimens in the collection exhibit considerable variation in regard to the weight of the zygomatic process, which does not appear to be of a sexual character, for the differences are not correlated with the size of the canine teeth. In the type of *M. montanus*, "the zygoma as far as the anterior border of the glenoid cavity is slender, and not convex, but flat in every direction, nor is it decurved, as in *M. superbus.* The zygomatic foramen is relatively much smaller than in that species, but is oblique outwards and forwards at an open angle. The obtuse median edge of the zygoma looks upwards, not outwards, as it does in *M. superbus* and *M. macrostegus*, and the superior expansion is opposite the internal extremity of the glenoid face, instead of the external, as in *M. superbus*, or the middle, as in *M. macrostegus*" (Cope, No. 7, p. 531).

None of the specimens in the Princeton collection agree altogether with the type in the construction of this region of the cranium. The description applies best to an almost perfect skull, which, however, differs from the type in the outward and backward direction of the posterior or preglenoid boundary of the "zygomatic foramen." The shape of this opening is different from that seen in the two John Day species which have been mentioned in having its longer axis directed antero-posteriorly, while in them it is transverse. In this specimen the massive and rugose superior expansion of the zygoma is, as in *M. macrostegus*, above the middle of the glenoid cavity, not above its internal edge, as in the type of the species. A second specimen has the long axis of the zygomatic opening transversely directed, as in the John Day species, and the zygomatic process with its superior expansion is almost as heavy and rugose as in *M. macrostegus.* This specimen may perhaps represent another species, but the variation in this region of the skull is so great that species can be distinguished only with difficulty. Other specimens show differences of greater or less degree from the two which have been described, which increases the difficulty of distinguishing species.

The jugal is flattened and beneath the orbit has great vertical depth. The orbits present more laterally and less obliquely forward than in *M. macrostegus;* they are also smaller and less prominent than in that species. The forehead is much narrower than in the John Day form and made more convex by the enlargement of the frontal sinuses and is decurved at the orbits. In *M. macrostegus* this decurvature does not occur; the forehead is very wide and almost perfectly flat. The lachrymal is very large and has a deep pit which is very much better marked than in *M. macrostegus.* The facial portion of the maxillary is shorter but has a greater vertical height. The nasals are very long and project beyond the alveolar border of the premaxillaries, as they apparently do not in *M. macrostegus;* their free ends are obtusely rounded and slightly decurved. They are broader and less decurved at the edges than in the John Day species, but nevertheless are somewhat convex from side to side. The shape of the muzzle is very different in the two species; in the more ancient form the premaxillaries are very broad, very much depressed and flattened, and the broad surface presents upward; the anterior nares are rather lower, but the narial notch is deeply incised, extending back over $\underline{\text{p. 2}}$. In *M. montanus*, on the other hand, the premaxillaries present their broad surfaces anteriorly, not superiorly, which makes the alveolar less depressed and of greater vertical depth; the narial opening is higher, but does not extend so far back, only a little behind the line of the canine.

The mandible also differs much in the two species. In *M. montanus* the horizontal ramus is somewhat deeper and has not so straight an inferior border; the symphysis is longer, straighter and more inclined, less procumbent and projecting at the incisive alveolus. The angle extends to a much less degree and less abruptly below the inferior border of the horizontal ramus, but, on the other hand, it projects farther behind the plane of the condyle, from which it is separated by a more decided notch. The masseteric fossa is smaller, but deeper and more distinctly demarcated. The coronoid is very peculiar; it is short, broad and blunt at the tip, and projects forward much more than upward, in consequence of which the coronoid notch is very broad and shallow.

The dentition has no very marked peculiarities. In the upper jaw the incisors are very small, with compressed, simple and obtusely pointed crowns; they increase regularly in size from the first to the third. The canines are very large and of the trihedral shape usual in the family. The anterior premolars have crowns which are low but long antero-posteriorly, with trenchant margins; $\underline{\text{p. 4}}$ is less extended in the fore-and-aft direction. The molars increase in size from the first to the third and exhibit little peculiarity of structure. The external buttresses or styles are quite prominent, but the metastyle of $\underline{\text{m. 3}}$, the enlargement of which is so constant a feature in species of *Merycochœrus* as to be of generic value, is smaller than in the John Day species. The para- and mesostyles are prominent, but thin and compressed, and the external faces of the para- and metacones are but slightly concave.

In the lower jaw the incisors are considerably larger than the corresponding upper series and have high, chisel-shaped crowns; that of the median incisor is very narrow; the second is broader and the third still more so. The canine is functionally one of the incisors, but is much larger than any of those teeth and its crown is pointed rather than chisel-shaped, with obliquely descending supero-external border, which is compressed and trenchant.

As in the oreodonts generally, $\overline{\text{p. 1}}$ has assumed the form and function of the canine and is very robust. The crown of $\overline{\text{p. 2}}$ is compressed, trenchant and elongate antero-posteriorly; the deuteroconid is represented by a ridge on the inner face. $\overline{\text{P. 3}}$

is similar, except that the inner ridge is more prominent and encloses a shallow posterior fossette. The fourth premolar has all the elements of a molar, though owing to the small size of some of these elements it cannot be called exactly molariform. The protoconid is crescentic and there is a small paraconid; the postero-external crescent is formed by the metaconid, which is low and obscurely separated from the protoconid; the deuteroconid is very clearly demarcated from the protoconid and a low tetartoconid completely encloses the posterior valley or fossette, while the anterior valley still opens internally between the para- and deuteroconids. The molars are high and elongate from before backward, and increase in size from $\overline{\text{m. 1}}$ to $\overline{\text{m. 3}}$; the cingulum is developed only on the front and rear faces of the crown, and a tubercle between the external crescents represents the mesostylid. The talon of $\overline{\text{m. 3}}$ is large and consists of two crescents separated by a narrow valley.

The only specimen of a cranial cast in the collection which can be referred to *Merycochœrus* is not in a satisfactory state of preservation and displays but little that is characteristic. Compared with the brain-cast of *Mesoreodon*, it exhibits similar differences to those which are to be observed between larger and smaller species of existing artiodactyls. The hemispheres are broader and of more uniform width, tapering less anteriorly; the convolutions are but obscurely marked in the specimen and can be interpreted only with difficulty, but the sulci appear to be more sinuous and the accessory sulci somewhat better developed than in *Mesoreodon*. The anterior portion of the hemispheres is of greater vertical depth proportionately, while the temporo-sphenoidal lobe is relatively rather smaller. The medulla oblongata is large and of subcircular section. The cerebellum is too much damaged for accurate description, but it appears to be rather high and narrow.

The atlas is broad, short antero-posteriorly and of robust construction. The anterior cotyli are large both vertically and transversely; the two surfaces are almost in contact below, but above are separated by a wide triangular notch which emarginates the neural arch. The neural canal is relatively small, especially its anterior opening. The sides of the neural arch are steeply inclined and end above in a massive tubercle, which forms a spine of unusual height. The articular surfaces for the centrum of the axis form an angle of about 45° with the median line; in shape they are low and wide and their medial edges are reflected upon the sides of the neural canal to form the very large continuous facet for the odontoid process. The inferior arch is strongly convex from side to side and displays a small hypapophysial tubercle near the hinder margin. The transverse process extends well forward and has converted the atlanteo-diapophysial notch into a foramen. The process is not much extended transversely but widens posteriorly; its course on the side of the vertebra is very obliquely downward and backward, and its antero-external border is thickened and rugose and curved upward in a way that is not found in the other genera of the family; there is no vertebrarterial canal.

The axis is not very well preserved in any of the specimens, but nevertheless some characters of importance may be determined. The centrum is long and depressed, with a prominent inferior keel and slightly concave posterior face. The odontoid process is peculiar; for most of its length it is broad and depressed, with flat superior and convex inferior surface and irregularly semicircular free margin; just before joining the centrum the vertical thickness of the process is suddenly increased, so as to form a step-like elevation on the upper surface along this line. The lateral borders are elevated for a short distance from the centrum, giving the process a spout-shaped section, but at the step already mentioned these raised borders abruptly cease and more than two-thirds of the dorsal face of the process is flat. The neural canal is notably small, with its greatest diameter directed transversely. The neural spine is enlarged into a great plate, which apparently is continued into a posterior spine-like process, as in *Eporeodon*, though this is not altogether certain.

The remaining cervicals have rather short, broad and depressed centra, with opisthocœlous and somewhat oblique articular faces; on the ventral side is a prominent keel, which bifurcates behind and into two tubercular ridges, which enclose between them a narrow triangular depression; on each side of the median keel is a deeply concave fossa. The neural canal is very small and of subcircular shape. The neural arch is broad and short and has a nearly flat dorsal surface. The zygapophyses are broad and flat and present nearly vertically and are but slightly oblique in position; the posterior pair considerably exceed the anterior in transverse breadth. The spine forms a low ridge on the third vertebra, but on the fourth it is well marked and becomes longer on the succeeding vertebræ, though it is still very short on the fifth. The transverse processes are variously developed on the different vertebræ; the pleurapophysial plate is very large and massive on the third, and especially so on the fourth, while on the fifth it is smaller and its posterior portion extends outward instead of backward. In all, except the seventh, the vertebrarterial canal is very large. As a whole, the neck of *Merycochœrus* was obviously rather short but heavy, as the structure of the vertebræ indicates the presence of massive and powerful muscles.

The thoracic vertebræ are represented by several from different parts of the column, belonging to one individual. In the anterior part of the region they have short, broad and depressed centra, with spines much heavier than usually occur in the oreodonts. Posteriorly, the centra become longer and assume the trihedral form with slightly opisthocœlous faces which is commonly found among the larger artiodactyls. In the middle and hinder parts of the region the spines become lower and more slender. The transverse processes in the middle region rise high above the centra and project conspicuously outward.

The lumbar vertebræ number at least five, since that many are preserved in one specimen. These vertebræ have long, depressed and arched centra, which are quite sharply contracted in the middle. As in the other vertebral regions, the neural canal is notably small, especially in the vertical diameter. The spines are very thin and compressed, but extended antero-posteriorly, and the transverse processes are long and wide but also very thin and depressed. The zygapophyses are of the usual interlocking character, and, in the anterior region at least, the metapophyses are conspicuous. Little is preserved of the sacrum, but enough to show that the pleurapophyses were massive and apparently confined to the first vertebra. No caudals are represented in any of the specimens.

The ribs are known only from a few fragments. It is obvious, however, that the anterior ribs were broader and more flattened than in the other oreodont genera, in which they are remarkably slender for hoofed animals, though probably *Merychyus* should be excepted from this statement.

The humerus is rather short but of massive construction, which is merely an exaggeration of the structure which occurs in the smaller and lighter genera of the family. The head is large, projecting strongly backward, and is very convex in both directions, so as to be of almost hemispherical shape. The external tuberosity is greatly enlarged and extends across the entire anterior face of the bone, and is strongly curved so as to follow the shape of the head; its free border rises steeply towards the inner side and is wider than the base, projecting at both ends, especially internally, where it is drawn out into a massive hook. The inner tuberosity is small and the bicipital groove very deep. The proximal portion of the shaft is compressed, but of great antero-posterior depth; the deltoid ridge is not very prominent, but extends far down the shaft. The distal end of the humerus is broad and the trochlea is characteristically like that of the other oreodont genera, as is especially seen in the broad, low and rounded intercondylar ridge and in the very prominent and massive internal epicondyle.

The ulna is heavy and altogether unreduced, being larger than the radius, except at the distal end. The olecranon is extremely high and deep antero-posteriorly and is thickened and grooved by a tendinal sulcus at the free end. The upper part of the articular surface for the humeral trochlea is broad, but then abruptly contracts and is continued downward only upon the internal side, and the radial facets are distinctly separated by a rather deep groove. The shaft is strongly arched forward and proximally is broad and trihedral; below, it becomes more and more compressed, and in the middle of its course is of almost rectangular section. The distal end is slightly contracted, both transversely and antero-posteriorly, and is almost concealed from view by the radius when seen from the front. The cuneiform facet is simply convex and has its long axis placed nearly in the fore-and-aft direction. The radius retains the family peculiarities in a very marked degree. The head is not greatly expanded and displays the usual three facets for the humeral trochlea. The shaft becomes more and more slender until the middle of its course is reached and then gradually broadens to the distal end. This form of shaft is highly characteristic of the oreodonts and is in marked contrast to the broad shaft of oval section which is found among the true ruminants. The distal end of the radius is broad, thick and rugose, contracting somewhat suddenly to form the carpal facets; there are no well-marked sulci for the extensor tendons. The surfaces for the scaphoid and lunar are connected in front by a sort of bridge, but for the rest of their extent they are separated by a wide and deep cleft. The scaphoid facet is somewhat oblique in position, is strongly concave from side to side, and is reflected far up upon the postero-internal angle of the bone. The lunar facet is wider and of a saddle shape, being somewhat convex transversely and concave antero-posteriorly.

The carpus of *M. montanus* presents some differences from that of the species from the upper Loup Fork, which I have elsewhere described under the name of *M. cœnopus* (No. 32, p. 346). The scaphoid is large in all its dimensions, but compared with that of the true ruminants, its most striking feature is its great vertical height. The radial surface is rather curiously shaped; the anterior ridge is narrow, but the articular surface descends far down upon the anterior face of the bone and the posterior concavity is extended in both directions. The antero-external angle of the proximal end is drawn out into a spur which occupies the "bridge" on the radius mentioned above. The inferior facet for the lunar is very large, both antero-posteriorly and (near the dorsal side) vertically as well; this facet is but slightly concave. The distal surface is very unequally divided between the facets for the trapezoid and magnum, that for the former being of nearly the same dorso-palmar depth, but much narrower transversely than the latter. There is no articular surface for the trapezium.

The lunar is a very curious bone; its radial surface is so warped as to be both convex and concave in both directions; the anterior border rises steeply towards the ulnar side, where it forms a narrow projection for the cuneiform. The proximal contact of the two bones is limited to this small facet, and behind it the upper portion of the lunar is much contracted. On the radial side there is no superior facet for the scaphoid, but the inferior one is very large and passes without interruption into the surface for the magnum, which is altogether lateral in position. In *M. cœnopus* the magnum facet is strongly convex, but in *M. montanus* it is almost flat. The lunar rests entirely upon the unciform and its whole distal surface is occupied by the large concave facet for that bone; it is very oblique in position and forms, with the magnum surface, a sharp edge or beak which descends almost to the third metacarpal and prevents any anterior contact between the magnum and unciform.

The cuneiform has an oblique position in the carpus, running outward and backward from the lunar. In shape it is rather low and narrow, but greatly extended in the dorso-palmar direction. The radial side presents two facets for the lunar, of which the proximal one is very small and the distal one quite large. The proximal surface for the ulna is a simple groove and the facet for the pisiform is large, triangular and almost flat. The distal face of the bone is occupied by the large and simply concave surface for the unciform.

The trapezium is preserved in Prof. Cope's type specimen and, as in the case of *Mesoreodon*, demonstrates that the pollex was not present. It is a small nodular bone which appears not to touch the scaphoid but to articulate merely with the trapezoid and second metacarpal.

When seen in position, the trapezoid appears to be as large as the magnum, but is really very much smaller in all its dimensions. The proximal side forms a narrow, imperfectly saddle-shaped facet for the scaphoid, and on the palmar side is a small surface for the attachment of the trapezium; on the ulnar side the trapezoid is closely applied to the magnum. The metacarpal facets are two in number, a large distal one for the second and a small infero-lateral one for the third metacarpal.

The exposed anterior face of the magnum is quite small and yet the bone is a rather large one. The proximal surface is altogether taken up by the facet for the scaphoid, the contact with the lunar being entirely lateral. The scaphoid surface is very convex and rises steeply towards the palmar side to form an ill-defined head. The lunar facet is but slightly concave and in this respect is very different from the surface which occurs in *M. cœnopus*, where the magnum encloses the lunar almost in a semicircle. On the radial side of the magnum is quite a deep concavity which receives the trapezoid. The hook-like process which is given off from the palmar side of the magnum is long and heavy and is strongly recurved towards the radial side. The distal side bears a saddle-shaped facet for the third metacarpal, but there is no anterior contact with the second.

The unciform is a large bone of irregularly cuboidal shape. The proximal surface is almost equally divided between the facets for the cuneiform and lunar, though the latter is somewhat smaller and much more oblique in position, being almost as much lateral as proximal and continuing without interruption into the facet for the third metacarpal, which is relatively large. The distal side bears facets for the fourth and fifth metacarpals, of which the latter is unusually large. The posterior hook of the unciform is long and heavy and projects downward and backward, but is not curved laterally.

In *Merycochœrus* the metapodials attain a degree of shortness and heaviness such as is found in no other genus of the family, and the lateral digits in particular are relatively very stout, so as to recall in some degree the feet of the hippopotamus. The second metacarpal is short and heavy, with a small head, which bears a narrow convex head for the trapezoid and on the postero-external side a small facet for the magnum. There is no anterior contact with the magnum, this bone being excluded from the second metacarpal by the extension of the third to the trapezoid. On the postero-external angle of the head is a small facet for the trapezium. The shaft is somewhat contracted in the middle and is broadest just above the distal trochlea, which is very unsymmetrical in shape. In *M. cœnopus* the second metacarpal is decidedly more slender and compressed than in the species before us.

The third metacarpal is much the stoutest bone of the series and its shaft is of almost uniform breadth throughout, though slightly expanding towards the distal end. The head bears a large number of facets and is very completely and perfectly interlocked with the surrounding bones. On the radial side is a flat, horseshoe-shaped surface for the second metacarpal, and above this a small, triangular facet for the trapezoid, which surface, however, is confined to the dorsal moiety of the bone, dying away towards the palmar side and allowing the second metacarpal to reach the magnum. The magnum facet is deeply concave from side to side and convex from before backward; the antero-external angle is drawn out into a heavy process, which overlaps the head of mc. iv and abuts against the unciform. The posterior facet for the fourth metacarpal is large and somewhat oblique, so as to extend slightly underneath that bone. The distal trochlea is low and broad; its carina is very prominent but does not extend upon the dorsal side.

The fourth metacarpal is of about the same length as the third and the shaft has the same antero-posteriorly compressed shape, though it is not so wide transversely. Although the fourth metacarpal is actually no longer than the third, it extends beyond it distally, for the third rises higher at the proximal end. In *Oreodon*, mc. iii considerably exceeds mc. iv in length and projects beyond it both proximally and distally. The surface for the unciform is not very broad and towards the palmar side it becomes obliquely lateral in position. The fifth metacarpal is somewhat shorter than the second and is heavier, especially towards the distal end; the facet for mc. iv is oblique in position. While the median metacarpals are closely applied to and run parallel with each other, the lateral ones, mc. ii and mc. v, diverge quite strongly from the median axis, and thus give a foot with a very broad base.

The phalanges are short, broad, much depressed and flattened. Unguals are not preserved in any of the specimens.

Except for its increase in size and weight, the femur differs but little from that of the older genera of the family. Compared with the femur of *Eporeodon*, the following changes may be observed. The head is rather more sessile and projects more upward and forward and the pit for the round ligament is larger and deeper. The neck is less constricted and the bridge connecting the head with the great trochanter is thicker and more rugose. The great trochanter, though massive and extended antero-posteriorly, is rather low, not rising so high as the head; it encloses a very deep digital fossa. The second trochanter is smaller and less prominent. The shaft is broader and less rounded and the medullary cavity is larger, with thinner walls. The deep pit above the external condyle for the origin of the plantaris muscle is more conspicuously marked. As in the John Day genus, the condyles are of nearly equal size and are separated by a wide and deep groove. The rotular trochlea is somewhat more modernized, being wider and less symmetrical; the external border is more prominent and continued farther distally than the internal.

The proximal end of the tibia is not known. The distal end is very heavy; the external fossa for the astragalus is considerably broader and less deeply incised than the internal one, and the malleolar process is remarkably long and heavy; on the external side is a small concave facet for the fibula. The fibula has a shaft which is very large in the antero-posterior dimension, though very thin and compressed laterally. In the upper Loup Fork species, *M. cœnopus*, the shaft is much more slender and reduced to almost thread-like proportions. The distal end is expanded into a very heavy external malleolus, which, like the shaft, has its greatest diameter antero-posteriorly. On the inner side is a projection which fits into a groove on the tibia, and distal to this is a large plane surface for the astragalus, which does not, however, occupy all of the tibial side of the malleolus. The calcaneal facet is narrow and slightly concave transversely, but extended in the fore-and-aft direction.

The tarsus is lower and broader and the individual elements more massive than in the earlier genera of the *Oreodontidæ*, but otherwise there is little change. The astragalus is low and broad; the external proximal condyle is considerably larger than the internal, but the difference is less extreme and the intercondylar groove is narrower and deeper than in *M. cœnopus*. On the distal trochlea the navicular surface is wider and the cuboidal narrower than in the last named species. The calcaneum is short and massive and is remarkable for the sessile character of the sustentaculum; in the other members of the *Oreodontidæ* the sustentaculum projects but very little beyond the tuber, though in none of them, except *Merychyus*, is this so marked as in *Merycochœrus*. The fibular facet is elongate antero-posteriorly, narrow and arched. The navicular is relatively wider than in *M. cœnopus*, but is so nearly like that of the older well-known genera as to require no detailed description. The cuboid is low and broad and differs from that of *Oreodon* in the relative width of the proximal facets, the astragalar being wider than the calcaneal, while in the White River genus the calcaneal is the broader. The difference in *M. montanus* is not, however, so marked as in the species from the upper Loup Fork. The calcaneal facet is not only narrower than in *Oreodon* but of different shape, the external border being straight and not projecting beyond the body of the bone. The facet for the astragalus is not so deeply concave as in the more ancient genera of the family, the dorsal and plantar margins not rising so high. On the tibial side are two facets for the navicular, which are separated by a deeper sulcus than in *Oreodon*. The distal side is almost completely taken up by the large facet for the fourth metatarsal; that for mt. v is very small and rather lateral than distal, while in *Oreodon* it is altogether distal. The posterior hook of the cuboid is very massive.

The entocuneiform is quite a large nodular bone, which articulates with the navicular and mesocuneiform and abuts against the plantar side of the head of the second metatarsal, which it holds firmly in place. As in all the known members of the *Oreodontidæ*, the meso- and ectocuneiforms are coössified, and, since the former has less vertical height than the latter, the compound bone appears to have a step cut in its distal side, which receives the head of the second metatarsal and prevents the third from reaching the mesocuneiform.

The metatarsus departs less from the family type than does the metacarpus, both in its proportions and in its mode of articulation with the podials. The median metatarsals are, however, relatively shorter and more massive and the laterals more reduced than in the more ancient genera. The slenderness of the laterals and their parallelism with the medials are in striking contrast to the lateral metacarpals, which, though shorter than the median pair, are nearly as heavy, and which diverge strongly from the axis of the manus. The second metatarsal is not only proportionately, but even actually, shorter than in the much smaller *Oreodon Culbertsoni*, and is the shortest of the series. The head articulates with all three of the cuneiforms; on the posterior side is a facet for the entocuneiform, the proximal end is supported by the mesocuneiform, and since the latter is of less height than the ectocuneiform, the fibular side of the head of the metatarsal is in contact with the ectocuneiform element of the compound bone. The shaft has considerable dorso-plantar diameter, but is very much compressed laterally, and therefore, when seen from the front, appears to be exceedingly slender. The third metatarsal is considerably longer than the second, though relatively very much shorter than in the other genera of the family, and is very massive. The proximal facet is almost plane and articulates only with the ectocuneiform ; a process on the fibular side slightly overlaps mt. iv, but appears not to reach the cuboid; if it does, the contact is very slight. The fourth metatarsal is somewhat longer and rather heavier than the third, and by its broad, plane proximal surface occupies nearly the entire distal side of the cuboid. The fifth metatarsal is somewhat longer and not so compressed and slender as the second; its contact with the cuboid is small and rather lateral than distal.

The phalanges do not differ in any important respect from those of the manus; they are somewhat longer and narrower, and those of the lateral digits are smaller. In particular, the unguals of these digits are very small.

CYCLOPIDIUS Cope.

Proceedings Amer. Philos. Soc., Vol. XVII, p. 221.

The distinction of this genus from *Leptauchenia* is an obscure one. Cope defines *Cyclopidius* in brief as being "*Leptauchenia* without superior incisor teeth;" but this character appears not to be altogether constant, for some specimens show a small alveolus in each premaxillary, and others, described below, have two minute upper incisors on each side. All the peculiarities of *Leptauchenia* are exaggerated in this genus. The lower incisors are reduced to two in each ramus. The upper canine is usually very small and extends but little below the level of the premolars; the latter, especially the two anterior ones ($\underline{\text{p. 1}}$ and $\underline{\text{p. 2}}$), are, in the typical species, reduced in size and simplified, but none are lost. The molars are more prismatic than in *Leptauchenia*, and in the upper series the external pillars or styles are more prominent. The first lower premolar retains the form and function of the canine, but is only slightly larger than in the canine proper. The facial region of the skull is much shortened and the vacuities enlarged; the brain-case is small and narrow, but the great expansion of the roots of the zygomatic processes makes the cranial region very broad and low. The auditory meatus is very long and its opening has a more elevated position than in *Leptauchenia*. The frontal zone is very short and the frontals form but little of the cranial roof. The nasals are short and slender rods, expanding somewhat anteriorly, where they meet the ascending processes of the maxillaries and premaxillaries; the latter are very small.

Cyclopidius incisivus Scott.

Amer. Naturalist, 1893, p. 661.

This species might with almost equal propriety be referred to *Leptauchenia*, since it is, in many respects, a connecting link between the two genera; it is much like *C. simus*, on the one hand, and *L. decora* of the White River beds on the other. It differs from the latter species principally in the much more reduced incisor teeth and in the larger premolars, and from the former in the presence of two incisors in the premaxillary, the larger upper canine and premolar teeth and in details of skull construction. As in all the species of *Leptauchenia*, the infraorbital foramen is very small and placed above $\underline{\text{p. 3}}$. The upper incisors, two in number, are extremely small, especially the median one, which is hardly more than a rudiment; the second incisor is almost twice the width of the first and has an obliquely truncate cutting edge. The two incisors of each side are implanted very close together, the first somewhat overlapping the second, while a considerable gap separates the median pair. The canine is larger than in the typical species of the genus, though this character may be sexual, and is followed by a short though distinct diastema, which about equals the fore-and-aft diameter of the canine. The premolars increase in size posteriorly. The first is very small and simple; $\underline{\text{p. 2}}$ has a low internal ridge representing the deuterocone, which in $\underline{\text{p. 3}}$ becomes very distinct and is connected by a ridge with the postero-external angle of the crown, the valley opening in front. The first three premolars have convex external faces, and are so inserted as to project slightly backward as well as downward. The molars increase in antero-posterior diameter from the first to the third, $\underline{\text{m. 3}}$ markedly exceeding $\underline{\text{m. 2}}$ in this dimension, as the latter exceeds $\underline{\text{m. 1}}$; in transverse width, however, $\underline{\text{m. 3}}$ is the least of the series and has much the highest crown.

The nasals are more expanded anteriorly at their junction with the maxillaries than even in *Leptauchenia decora*. The nasal opening is terminal, presenting anteriorly, and is of heart-like shape, with the apex downward. The premaxillæ are of somewhat peculiar form; the alveolar portion is insignificant, but the ascending rami form quite a high symphysis and present their broad surfaces anteriorly, while the superior expansions are twisted, so as to present laterally. The palate is long, broad, and concave from side to side, the two molar series being almost parallel, while the premolars converge anteriorly. The palate is carried farther behind the last molar than in *L. decora* and, compared with that species, the posterior nares have been shifted backward. The incisive foramina are very small and anterior in position.

Measurements.

	M.
Length of molar-premolar series	.064
Length of premolar series	.029
P. 1, length	.005
P. 1, width	.004
P. 2, length	.007
P. 2, width	.005
P. 3, length	.008
P. 3, width	.006
P. 4, length	.007
P. 4, width	.007
Length of molar series	.037
M. 1, length	.009
M. 1, width	.010
M. 2, length	.013
M. 2, width	.010
M. 3, length	.015
M. 3, width	.009

The type of this species was found by Mr. R. Stevenson in the upper beds.

Pithecistes Cope.

Proceedings Amer. Philos. Soc., Vol. XVII, p. 219.

In this genus, which is as yet very imperfectly known, the *Leptauchenia* series of oreodonts appears to have reached its culmination. The lower incisors are reduced to one, the canine has resumed its original functions, and the caniniform premolar has disappeared. The other premolars are greatly reduced in size and the mandible is extremely shortened in consequence.

Found only in the upper beds of the Deep River valley.

Mutual Relations of the Oreodont Genera.

In my paper upon this family (No. 32), lack of material compelled me to leave many questions with regard to the mutual relations of its genera unsolved and even unattempted. The newly discovered material will enable us to answer some of these questions with a reasonable degree of probability. We may first consider the origin of *Merychyus*.

The relationship of *Mesoreodon* to the typical *Eporeodons* of the Oregon John Day is very obvious and need not be dwelt upon, the only difference of taxonomic value between the two genera being in the structure of the manus, and indeed there is much to be said in favor of giving *Mesoreodon* only subgeneric rank. Nevertheless, in the skull and, to a less degree, in the dentition, we may observe numbers of slight and subtle changes which are all in the direction of *Merychyus.* If such species of the latter genus as *M. zygomaticus* and *M. pariogonus* be taken into account, the transition from *Mesoreodon* is seen not to be very great or abrupt, though as regards dentition and skull structure there still remains a considerable gap between the two genera, which is only one of the many signs that point to a hiatus between the lower and upper beds of the Deep River deposits. In the *Merychyus* species from the lower Loup Fork (upper Deep River), *M. zygomaticus* and *M. pariogonus*, the face has become deeper and the cranium shorter and the wing-like posterior processes of the parietals are reduced; the nasals are shortened and a fontanelle is formed between the frontal, lachrymal and maxillary. The premaxillaries are depressed, flattened, and ankylosed at the symphysis. In foot structure, *Mesoreodon* has already attained the condition of *Merychyus*, especially if the more slender and elongate foot of *M. intermedius* be regarded. In the dentition the principal change consists in a modification of the premolars and a rearrangement of the adjacent horns of the internal crescents on the upper molars, for *Merychyus pariogonus* shows that the hypsodont molars have been acquired within the limits of the genus. We may, therefore, provisionally at least, regard *Mesoreodon* as ancestral to *Merychyus*, and the line of descent would then be: *Oreodon—Eporeodon—Mesoreodon—Merychyus.*

If this view of the case be correct, then the relationship of *Merychyus* to *Merycochœrus* must be strictly one of parallelism, by which the articulation of the third metacarpal with the trapezoid and the depressed and ankylosed premaxillaries have been independently attained in the two genera. *Merychyus* has also run parallel to *Leptauchenia* in the development of facial vacuities and in the disposition of the crescents of the upper molars as well as their hypsodont character. Yet, now that we know the skull structure of these two genera, no one could seriously maintain that they are genetically connected, though Leidy's suggestion of such connection was natural enough from the material at his command. To unite *Merychyus* and *Merycochœrus* into a single genus, as Leidy proposed in his later work (No. 24, p. 201), a suggestion which Bettany adopted (No. 1, p. 262), would be to construct an unnatural polyphyletic group, unless genera are to be artificial assemblages united only by certain common characters, the morphological value of which is unimportant. It must be remembered that *Merycochœrus* is a much older form than *Merychyus*, its peculiarities having all been established in the John Day. To derive the latter genus from the former, it would be necessary to make some highly improbable assumptions. (1) We should have to assume that the face had become depressed upon the basicranial axis, only to again straighten out and lie in a line with that axis. (2) That the face, after having elongated more than in any other genus of the family, had once more become shortened. (3) That the orbit, after retreating backward so as to be almost entirely behind the line of the molar teeth, had again advanced over those teeth. (4) That the zygomatic arches, after having attained an extraordinary degree of size, massiveness and rugosity, had dwindled to proportions even smaller and lighter than those of *Oreodon*. (5) That the posterior nares had first been pushed back to a remarkable extent, and had again resumed their original position. (6) That the metapodials, after becoming short and massive to a very unusual extent, had attained a degree of length and slenderness which is equally unusual in this family.

We have, it is true, already found reason to believe that, in the horses, progress in the main is accompanied by a certain amount of oscillation in the minor details of structure and that even a certain degree of specialization in a direction away from that taken by the phylum as a whole, may be overcome and suppressed, as, for example, in the case of the elbow joint of *Mesohippus*. Nevertheless, we know of no facts which would justify us in assuming oscillations of such amount as would be involved in the derivation of *Merychyus* from *Merycochœrus*. If we reject *Mesoreodon* from the ancestry of the former genus, then we must admit parallelism in the structure of its manus, and thus, whichever horn of the dilemma be accepted, the fact that "adaptive" reduction of the manus has occurred twice independently within the limits of the family cannot be avoided, for to regard *Mesoreodon* as in any way descended from *Merycochœrus* is a manifest absurdity. The simplest and most probable conclusion is therefore that *Merychyus* and *Merycochœrus* represent two independent branches of the oreodont stem, which in some respects have paralleled each other, the former not attaining until the Loup Fork the structures which the latter had already developed in the John Day.

Recent discoveries have also thrown some light upon the relationships of the *Leptauchenia* series. Leidy ascribed that genus to the White River formation, while Cope believed that it was confined to the Deep River beds, though it had not been found in the typical (Montana) locality of that horizon. In my former paper I followed Cope's determination, chiefly on the ground that no member of this series has ever been obtained in the John Day beds. It is now proven, however, that Leidy's determination is the correct one. Dr. Wortman informs me that he has found *Leptauchenia* in the upper White River beds, and during the past summer (1893) the Princeton party found them in great numbers at the same locality. The morphological difficulty, that all three members of the *Leptauchenia* series were found only in the same horizon is thus removed, but we are still in the dark with regard to the ancestry of this line, which must be sought for in the lower White River beds. We may, however, confidently remove it from all connection with *Merychyus*.

Fam. Indet.

Hypertragulus calcaratus Cope.

Bull. U. S. Geol. and Geogr. Surv., No. 1, 1874, p. 26.

A mandible, which is indistinguishable from that of the species named, was found in the lower beds of the Deep River valley, and some specimens from the upper, or Loup Fork, beds of the same locality seem to indicate that the same or a closely allied genus was continued up into the latter series, but the specimens are too fragmentary for certain reference.

BLASTOMERYX Cope.

U. S. Geogr. Surv. W. of 100th Mer., Vol. IV, Pl. II, p. 350.

The status of this genus is very obscure and uncertain. The name was originally applied to $\overline{\mathrm{m.\ 3}}$ of a small animal from the upper Loup Fork of Colorado and New Mexico, which appears to be very much like *Cosoryx*, differing from the latter in the shortness of the molar crowns and better development of the basal pillar. So very little is known of the dentition of this animal that its relationships are quite indeterminate beyond the obvious fact of its alliance with *Cosoryx*. The much larger and more robust species from the lower Loup Fork or Deep River, which has been referred to this genus, not improbably represents a very different one, but materials are lacking for an exact comparison. This Deep River species is in many ways similar to the larger species of *Palæomeryx* from the upper Miocene of Europe, and perhaps should be referred to that genus, though in the present state of knowledge it would be premature to do so. This doubt is justified by the fact that the mandibular dentition of *B. borealis* is still unknown, and we cannot therefore determine whether the lower molars possessed the very characteristic "Palæomeryx fold," and it is uncertain whether the type of the European species had developed horns. Schlosser does not regard the presence or absence of horns as a character of generic value, but with this view I am unable to agree. Further, the character of the horns and the shape of the occiput are different from anything which has been observed in the European types. For these reasons, the name *Blastomeryx* may be provisionally retained. However, by whatever name we call it, there can be little doubt this genus represents a more or less modified migrant from the Old World, not only because of its close similarity, or even identity, with some of the genera of that region, but also because it represents a new element in the American fauna, no form being known from the White River or John Day formations from which it could be derived. That an interchange of mammals between the two continents took place at some time subsequent to the John Day and before the beginning of the Loup Fork is made evident by such types as *Anchitherium*, *Blastomeryx* and *Mastodon*.

BLASTOMERYX BOREALIS Cope.

Proceedings Amer. Philos. Soc., Vol. XVII, p. 222.

This species is quite a large one, though somewhat smaller than the *Palæomeryx magnus* and *P. sansaniensis* of Sansan. The skull is remarkable for the high and narrow occiput, the upper portion of which is drawn out into a long, backwardly projecting process composed of the parietals and supraoccipital, which is very similar to the corresponding part of the occiput in the *Oreodontidæ*. The horns are trihedral at the base, gradually becoming rounded distally, and are of remarkable length; they are perfectly simple and unbranched, and in no specimen which I have seen is there any trace of a burr. The surface of the horns is faintly marked by vascular impressions, but is on the whole remarkably smooth, much more so than in the antlers of the deer, and, as Cope has suggested, they were doubtless covered with skin throughout the lifetime of the animal. "At the base of the horn on each side a wing-like expansion extends outward posterior to the orbit" (Cope). The upper premolars, three in number, have the internal crescent or deuterocone complete; $\underline{\text{p. }2}$ and $\underline{\text{p. }3}$ are massive and oval in section, while $\underline{\text{p. }4}$ is more extended transversely. The molars are very brachyodont and are covered with very rugose and strongly wrinkled enamel; the internal crescents are complicated by accessory spurs, which invade the valleys. The internal pillar or style is very variable, being sometimes quite large, while in many specimens it is absent from one or other of the molars.

BLASTOMERYX ANTILOPINUS Scott.

Amer. Naturalist, 1893, p. 662.

The type of this species is represented by a mutilated skull, three cervical vertebræ and various bones of the fore and hind limbs. It differs from the foregoing species principally in size, being decidedly smaller; the median ribs of the external crescents on the upper molars are less prominent. Other differences are to be observed, but they are perhaps rather apparent than real and due to the imperfect condition of the specimen. The muzzle is broken away, not only in this, but in all known specimens of *B. borealis* as well, and hence nothing is known as to the presence or absence of the upper canine. No isolated teeth have as yet been found in the Deep River beds which can be regarded as the upper canines of *Blastomeryx*, and Filhol reports the same fact with regard to the *Palæomeryx* of Sansan (No. 13, p. 251). On the other hand, Fraas (No. 16, p. 38) refers the muntjak-like canines which he obtained at Steinheim to the species of *Palæomeryx* occurring at that locality.

In the type specimen of *B. antilopinus* all the premolars are more or less injured; $\underline{\text{p. 1}}$ appears to be altogether absent; $\underline{\text{p. 2}}$ is represented only by the fangs, but enough remains of $\underline{\text{p. 3}}$ and $\underline{\text{p. 4}}$ to show that they differ only in size from those of *B. borealis*. Compared with the corresponding teeth of such European species as *Palæomeryx magnus* and *P. sansaniensis*, these premolars are distinguished by the better development of the deuterocone, the narrower valleys and the character of the cingulum, which is but faintly marked on $\underline{\text{p. 4}}$ and absent from $\underline{\text{p. 3}}$. The latter tooth is the largest of the series, exceeding $\underline{\text{p. 4}}$ not only in antero-posterior but also in transverse diameter. The molars increase progressively in size from the first to the third, and in all the transverse width is but slightly less than the antero-posterior length, and the cingulum is confined to the front face of the antero-internal crescent. The anterior and median external pillars (para- and mesostyles) are prominent. The median rib on the outer face of the antero-external crescent is also conspicuous, though on $\underline{\text{m. 1}}$ this ridge is less prominent than in *B. borealis;* the rib of the postero-external crescent is almost obsolete. The internal pillar increases in size from $\underline{\text{m. 1}}$ to $\underline{\text{m. 3}}$, being much larger on $\underline{\text{m. 3}}$ than on either of the other molars; in *B. borealis* this pillar is very small or absent on $\underline{\text{m. 3}}$ and larger on $\underline{\text{m. 1}}$ and $\underline{\text{m. 2}}$. The internal crescents of the molars are much like those of *B. borealis;* the anterior one is less complete than the posterior, its hinder horn being especially shortened; on $\underline{\text{m. 3}}$ the adjacent horns of the two internal crescents are curiously crenulate, in a way that recalls the transverse crests on the upper molars of some of the extinct horses. In *B. borealis* this does not appear to be the case. The upper molars of the Sansan species differ from those of the Montana forms principally in the much better developed cingulum, which embraces the entire crown of the tooth except on its outer side, and in the less developed internal pillar, which is hardly more than indicated in Filhol's figures. The inner crescents are not crenulate and are less complicated by spurs which invade the valleys, and the valleys themselves are more widely open. The *P. furcatus* from Steinheim which Fraas has figured (No. 16, Pl. VIII, Fig. 9) is more like the American species in regard to the structure of the upper molars, so far as can be judged from the drawings. This species is also of interest as showing a mode of formation of the internal crescent of $\underline{\text{p. 2}}$, which I have elsewhere shown to be characteristic of *Procamelus* (No. 34, p. 436), viz, by the coalescence of two distinct ridges in the median transverse line, instead of what is much more usual in the Artiodactyla and universal in the case of $\underline{\text{p. 4}}$, by the extension of ridges from the internal cusp or deuterocone.

Measurements.

	M.
Length of premolar-molar series	.079
Length of premolar series	.037
P. 2, length	.013
P. 3, length	.013
P. 4, length	.011
Length of molar series	.043
M. 1, length	.014
M. 1, width	.013
M. 2, length	.016
M. 2, width	.015
M. 3, length	.017
M. 3, width	.016

N. B.—It will be observed that the length of the molar series is less than the sum of the lengths of the individual teeth. This is due to the slight overlapping of the successive molars.

The general aspect of the skull (Pl. VI, Fig. 48) is quite similar to that of *Antilocapra*, though there are many important differences, which, as would naturally be expected, are in the direction of more primitive conditions. The cranium is very long and the face relatively short, as compared with that of most recent ruminants, though long in proportion to the more ancient forms of the group. In correspondence with this, the orbit is placed quite far forward, its anterior rim extending almost to a line above $\underline{\mathrm{m.\ 2}}$, and the zygomatic arch is decidedly longer than in the prong-buck. The upper contour of the skull is almost straight, there being hardly any descent at the forehead and little arching of the cranium. In some respects the skull of *Blastomeryx* is more modernized than that of existing hornless deer, such as *Hydropotes* and *Moschus*, especially in the backward shifting of the orbit. In *Hydropotes* the orbit is almost entirely over the molars and in *Moschus* its front border extends nearly as far as the posterior border of $\underline{\mathrm{m.\ 1}}$. In both genera, and especially in *Moschus*, the orbit is raised much higher above the molar alveolus than in *Blastomeryx.* On the other hand, the recent genera have a proportionately shorter and more rounded and capacious cranium, the upper contour of which is much more decidedly arched from before backward, and the occiput is lower and without wing-like extensions of the parietals. The paroccipital processes are not advanced in front of the occipital condyles; the zygomatic arch is much shorter and the glenoid cavity more elevated above the plane of the molars, indicating a higher ascending ramus of the mandible.

The specimens do not indicate that in *Blastomeryx* the face was bent down the basicranial axis, as in the recent Cavicornia and some other artiodactyls, but appears rather to have been in the same line with it. The occiput is very broad at the base;

in the median line, above the foramen magnum, is a wide convexity bounded on each side by a shallow fossa. Towards the summit of the inion this convexity passes into a shallow concavity with a faint median keel, inclosed between processes of the supraoccipitals and parietals. These processes are broken away in the specimen, so that their length cannot be determined. Apparently, however, they were not so long and prominent as in *B. borealis*, in which the occiput is utterly unlike that of any existing ruminant and has more the peculiar shape characteristic of the *Oreodontidæ*. Neither Filhol nor Fraas give figures of this region of the skull in *Palæomeryx*, but *Dicroceros* has an entirely different occiput (see Filhol, No. 13, Pl. XXXIV, Fig. 4) which is broad and low and forms a nearly vertical plane.

The paroccipital processes in *Blastomeryx* are long, laterally compressed, and broad at the bases, which are closely applied to the tympanic bullæ. Between the condyle and the paroccipital process the inferior surface of the exoccipital displays a large, deep fossa, which is much larger and more deeply impressed than in *Antilocapra*, and the process stands much more in advance of the condyle than in that animal. The mastoid is exposed upon the surface of the skull and forms quite an area between the squamosal and exoccipital; its lower end forms a dense rugose mass, though there is no proper mastoid process. The relations of the mastoid are very much the same as in the prong-buck, except that it is more advanced in front of the condyle in position and descends lower upon the paroccipital process. The cranium is long and quite full and rounded, though more slender and less capacious than in *Dicroceros*. The parietal zone is very long and roofs nearly the entire cranial cavity; obscurely marked temporal ridges pass backward from the bases of the horns and converge to form a low but distinct sagittal crest, which is longer than in the European genus. The postorbital constriction is not strongly marked, though much more so than in the existing genera of horned ruminants. The squamosal is very large and makes up nearly the whole side wall of the cranium; the root of the zygomatic process forms a thin, depressed plate, which is much extended in the antero-posterior direction and is pierced by a large venous foramen. The zygomatic arch is slender and depressed, and though the distance from the postglenoid process to the last upper molar is nearly the same as in *Antilocapra*, yet, owing to the more anterior position of the orbit, the zygomatic arch is considerably longer than in the modern genus. The glenoid cavity is thoroughly ruminant in character, though the anterior convexity and posterior concavity are more decided and the postglenoid process somewhat longer than in the prong-buck. The tympanic bullæ are small and of the shape usual in the antelopes, with a deep groove for the attachment of the hyoid apparatus, a feature which is cervine rather than antelopine; the auditory meatus is a long tube which is directed more posteriorly than in *Antilocapra.*

The frontal zone extends considerably in front of the orbits, though but little behind them, and hence takes but a small part in roofing the brain-chamber; these bones lie in nearly the same plane throughout their length, and the descent at the forehead is slight, very much less than in the prong-buck and apparently less than in *Dicroceros.* Apart from the horns, the upper contour of the skull is thus almost a straight line. The horns are very peculiar and quite unlike those of any other known genus, fossil or recent. At the base the section forms a spherical triangle, the three sides of which present forward, backward and inward; the anterior face is concave, a feature which is much more marked in this species than in *B. borealis;* the other faces are convex. In the specimen before us the horns are broken away about three inches above the base, but Prof. Cope's numerous skulls of the larger species show that in that form, at least, the horns were remarkably long, perfectly simple and non-deciduous, none of them exhibiting any burr or any tendency to branch. The young stages of *Dicroceros* have a very similar unbranched horn, but the many known skulls of *Blastomeryx* show that this simplicity is not a transitory character in this genus (see Filhol, No. 13, Pl. XXXIV, Fig. 3). Faintly marked grooves and ridges may be seen on the surface of the horns, but their smoothness indicates, with great probability, that they were permanently covered with skin. The external angle of the base of the horn is in *B. borealis* continued into a wing-like process which extends outward behind the orbit. In the type of *B. antilopinus* this process is broken away, but it can hardly have been so prominent as in the larger species. As in *Dicroceros* and *Antilocapra*, the horns rise directly above the orbits, but are more erect than in the former genus; the postorbital process is given off from the base of the horn. A large foramen, the supraorbital, pierces the base of the horn and two smaller ones perforate the frontal in advance of the latter; these foramina have a more anterior position than in the prong-buck.

Between the frontal and the lachrymal there is a narrow, slit-like fontanelle, the incipient stage of the much larger vacuity which occurs in the deer and many antelopes. Cope's figure of *B. borealis* (No. 7, Fig. 16) does not show this vacuity; if it be really absent in that species it will form an important specific distinction. The nasals, premaxillaries, and most of the maxillaries are destroyed, but enough of the latter remains to show that the alveolar portion is very low in correspondence with the extremely brachyodont character of the dentition and that the facial portion is high. In consequence of this, the face is deep vertically, quite as much so as the cranium, and the line from the molars to the occipital condyle is straight and nearly parallel with the straight upper surface of the skull. There is no trace of a lachrymal pit in front of the orbit. In *B. borealis*, and doubtless in the present species also, the maxillaries are sharply constricted in front of the premolars. The infraorbital foramen occupies a slightly less advanced position than in *Moschus*, opening above the internal between $\underline{\text{p. 2}}$ and $\underline{\text{p. 3}}$, while in the existing genus it is over the middle of $\underline{\text{p. 2}}$. The palate is broad and gently arched from side to side; between the molars it is of nearly uniform width, but it narrows anteriorly, the two premolar series converging slightly forward. The posterior nares extend to about the middle of $\underline{\text{m. 3}}$ and are very long from before backward, in correspondence with the length of the cranium and zygomatic arches. As contrasted with the base of the skull in *Antilocapra*, the principal difference to be observed is the elongation of the posterior portion, especially the region between the occipital condyles and paroccipital processes, which points to a greater development of the cerebellum and medulla oblongata and is very usual in the crania of primitive mammals. The orbit is also much lower down and farther forward in the face, its upper border not projecting above the superior contour of the cranium.

Nothing is known of the mandible in either species, except some uncharacteristic fragments.

From the foregoing description it will be at once evident that while the skull of *Blastomeryx* is in many respects more primitive than that of any of the recent Pecora, yet it is manifestly of that type and, in some details, such as the character of the occiput and the wing-like processes from the bases of the horns, the genus is specialized in a way peculiar to itself and which renders it somewhat doubtful whether any existing form is to be derived from it.

Measurements.

	Blastomeryx antilopinus.	Antilocapra americana.
	M.	M.
Width of occiput at foramen magnum	.078	.079
Distance from crest of inion to middle of horn	.104	.085
Antero-posterior diameter of horn base	.036	.041
Transverse diameter of horn base	.046	.024
Depth of face at $\underline{\text{m. 3}}$	.067	.070
Distance from foramen magnum to postglenoid process	.051	.045
Distance from postglenoid process to $\underline{\text{m. 3}}$	.073	.069
Width of palate at $\underline{\text{m. 3}}$	.036	.052

The vertebral column is represented by the second, third and fourth cervical vertebræ. The axis is completely modernized in character and differs only in details from that of *Cervus* or *Antilocapra*. The centrum is broad anteriorly, where it expands to form the atlanteal surface; behind this it contracts, to expand again slightly towards the posterior end; the hinder face is concave and there is a strongly marked hypapophysial keel. The articular surface for the atlas does not rise quite so high upon the sides of the neural canal as in *Cervus;* its inferior border is more curved and the median notch more deeply cut. The neural canal is lower and broader anteriorly, posteriorly its opening is notably small; the pedicels of the neural arch are perforated for the second pair of spinal nerves, but the foramina are smaller than in *Cervus;* in its anterior portion the neural arch is thin and plate-like, but gradually thickens until, at the level of the postzygapophyses, it becomes massive and diploëtic. The spine is so broken that its shape cannot be determined, but it appears to have been thicker and heavier than in *Cervus elaphus.* The transverse processes are also broken away, but it can be seen that they were slender and probably short. The odontoid process is completely spout-shaped but has a somewhat greater vertical thickness than in the smaller species of *Cervus.* The postzygapophyses are small and present outward as well as downward. As compared with the axis of *Antilocapra*, that of *Blastomeryx* is of almost the same antero-posterior length, but the surface for articulation with the atlas is wider, the median contraction less pronounced and the whole centrum more massive; the base of the spine is also thicker. But these differences are slight; in general, the axis is very much the same in the two forms.

The third and fourth cervical vertebræ are likewise of very similar construction to those of the prong-buck; the centra are of almost exactly the same length as in that animal, but the neural arches are somewhat shorter, and thus the gaps between the successive arches are larger; the arches are also distinctly wider transversely. The zygapophyses project more beyond the pedicels of the arch. The neural spines are very low, though better developed than in *Antilocapra*; on the third vertebra the spine is anteriorly a single ridge, which projects beyond the front of the neural arch and behind bifurcates into two ridges, one running to each of the postzygapophyses. On the fourth the posterior ridges are low, but the anterior rises into a distinct but very short spine. On the corresponding vertebræ of the prong-horn these ridges are indicated only in the feeblest way.

Measurements.

	B. ANTILOPINUS.	A. AMERICANA.
	M.	M.
Length of centrum of axis	.062	.064
Width of anterior face of axis	.048	.044
Third cervical, length of centrum	.050	.052
Fourth cervical, length of centrum	.054	.051

The fore limb is represented by a broken humerus, with the ulna, radius and cannon-bone nearly complete. The length of the humerus cannot be determined, as the proximal end is missing, but apparently it was about equal to that of *Antilocapra*. On the other hand, the shaft is heavier, especially in the transverse dimension, than in that animal and the deltoid ridge much more roughened and prominent and descending farther. The anconeal fossa is deep, but notably small, and the supratrochlear fossa is shallower and less distinctly marked than in the modern genus. The trochlea is wider and the intercondylar ridge even more prominent and has a more oblique course, downward and inward; the external condyle for the radius is relatively somewhat broader; the internal epicondyle is distinctly larger. The distal end of the humerus is much like that of *Dicroceros* in the less uniform vertical height of the trochlea, which tapers towards the outer side, and in the more external position of the intercondylar ridge (cf. Filhol, No. 13, Pl. XXXVIII, Fig. 4).

The ulna is somewhat more reduced than in *Palæomeryx furcatus* and less so than in the American antelope, and, so far as can be judged from the only available specimen, was not coössified with the radius at any point. The olecranon is missing, but appears to have projected more decidedly backward than in *Antilocapra*. The proximal radio-ulnar articulation is very different from that of the last-named genus, especially in its much greater vertical diameter and in the larger size of the external radial facet, which, however, is set off less distinctly from the body of the bone. The radio-cubital arcade is longer than in the prong-buck, but owing to the shape of the ulnar shaft is narrower. The shaft is very thin and compressed, but proximally has a considerable antero-posterior diameter, which diminishes rapidly as we pass downward. The distal end has but a slight fore-and-aft dimension, but is somewhat thickened transversely and is deeply notched to receive the external angle of the radius.

The radius (Pl. VI, Fig. 49) is but little shorter than that of *Antilocapra*, but has quite a different shape; the lateral and antero-posterior curvatures of the bone are very much as in the recent genus, while the shaft is much broader and less rounded, of oval transverse section and more uniform diameter, much compressed antero-posteriorly, except for the lower one-third of its length. Filhol's figure of the radius of *Palæomeryx magnus* (No. 13, Pl. XXVIII, Fig. 3) shows a very similar shaft, except for a more pronounced lateral flexure which approximates a sigmoid curvature and for a narrower proximal end. The radius of *Blastomeryx*, so far as its general shape is concerned, is more like that of the fallow deer than of the prong-buck. The trochlea is wider than in the latter, the groove for the intercondylar ridge of the humerus is narrower and emarginates the anterior border more deeply, and the ridge external to that notch is wider in correspondence with the more mesial position of the intercondylar ridge. The process for the attachment of the external ligament is a sharp, compressed ridge, which is not so prominent as the massive tubercle of the prong-horn's radius, and hence the latter, though having a narrower trochlea, measures more across the proximal end than does that of *Blastomeryx*. The distal end differs little from that of the prong-horn, though owing to the broader shaft it expands relatively less; on the anterior face is a broad sulcus for the extensor tendons, bounded by sharp ridges, the inner one of which bifurcates near the distal face, forming a second and much narrower sulcus. The carpal facets are very modern in character, except for the less width of the lunar surface, and run very obliquely across the distal face from before backward and mesially; the scaphoid and lunar facets are separated throughout by a sharp ridge and both are reflected far up upon the posterior side of the radius. As in existing ruminants, the radius has expanded so as to come into contact with the cuneiform, though the facet for that bone is much smaller than in the prong-buck.

Nothing is known of the carpus, but it may be inferred from the facets of the radius that the lunar is relatively less expanded than in most existing Pecora.

The metacarpus (Pl. VI, Fig. 50) is in the shape of a well-defined cannon-bone, consisting of the coalesced third and fourth metacarpals; no trace of the laterals (ii and v) is preserved, but they were nevertheless probably present in very reduced form, as may be confidently inferred from the condition in *Cosoryx*. The cannon-bone is considerably shorter than that of the prong-buck, is distinctly stouter and of quite different shape. In *Antilocapra*, *Cosoryx* and *Blastomeryx gemmifer* the proximal end is much compressed in the antero-posterior direction, but in *B. antilopinus* this compression is slight, the transverse diameter but little exceeding the fore-and-aft. The latter diameter diminishes steadily towards the distal end, increasing slightly above the phalangeal trochlea; the groove on the posterior face of the shaft is deeper in its proximal portion than in the prong-horn, but is not continued so far down. As in the ruminants generally, the distal venous foramen on the anterior face is extremely small. The trochleæ for the phalanges are somewhat lower than in most existing Pecora, but the carinæ are complete, extending over the entire dorsal face of the trochleæ.

No phalanges are associated with the specimen.

Measurements.

	B. ANTILOPINUS.	A. AMERICANA.
	M.	M.
Humerus, breadth of distal end	.041	.033
Humerus, depth of shaft above anconeal fossa	.022	.017

	B. ANTILOPINUS.	A. AMERICANA.
	M.	M.
Radius, length	.198	.205
Radius, breadth of proximal end	.033	.036
Radius, breadth of distal end	.037	.033
Radius, breadth of middle of shaft	.024	.021
Cannon-bone, length	.181	.206
Cannon-bone, breadth of proximal end	.026	.027
Cannon-bone, depth of proximal end	.021	.019
Cannon-bone, breadth of distal end	.032	.026

The femur is badly mutilated, having lost the articular portions of both extremities, and yet the part which remains is longer than the entire femur of *Antilocapra;* the shaft is arched forward, compressed and deep, and is decidedly heavier and of less cylindrical shape than in the recent type. The distal portion is trihedral in section and quite massive; the supracondylar fossa is more deeply marked and rugose and the linea aspera is more prominent.

The tibia is very similar to that of the prong-horn and of almost exactly the same length, but heavier and of more massive construction throughout. The spine is lower and less distinctly bifid, the cnemial crest heavier, more prominent and descending lower upon the shaft. On the posterior face the roughened lines for muscular attachment are much more prominent and rugose. The lower portion of the shaft is less rounded, broader and more oval in section; the distal end is broad and heavy; the fibular facet is altogether distal and shows that the fibula was reduced to a mere nodule. The internal malleolus is very long, the posterior intercondylar ridge or tongue is better developed than in the prong-horn, and the sulcus for the flexor tendons is rather more deeply incised.

The tarsus (Pl. VI, Fig. 51) is completely modernized and may be briefly passed over, as it presents but few characters of interest. The astragalus is both higher and wider than in *Antilocapra* and in general outline is very similar to Fraas' figure of *Palæomeryx furcatus* (No. 16, Pl. VIII, Fig. 13). The pit for the distal median tongue of the tibia is much shallower than in the recent form and the facet for the internal malleolus less deeply incised. The articular surface for the sustentaculum is very large and passes without interruption into the distal trochlea; the latter is almost equally divided between the cuboid and navicular surfaces.

The calcaneum is remarkably long, much more so than in the prong-buck or *Palæomeryx furcatus;* this elongation, however, chiefly affects the tuber, the portion distal to the sustentaculum being of nearly equal length in all three species. The tuber is deeper (dorso-plantar diameter) and of more uniform depth than in *Antilo-*

capra, tapering less towards the free end. The sustentaculum, fibular and calcaneal facets present no noteworthy peculiarity.

As in the Pecora generally, the cuboid and navicular are coössified; the compound bone is somewhat broader and of about the same vertical height as in the prong-horn. The distal facets on the cuboid portion are quite different from those of *Palæomeryx furcatus* as figured by Fraas (No. 16, Pl. VIII, Fig. 12); the surface for the main part of mt. iv is broader, especially in front, while that for the posterior hook of the same metatarsal is very much smaller.

The length of the hind cannon-bone cannot be determined, as none of the specimens are complete. It is evident, however, that it exceeded the fore cannon-bone in this respect more than is usually the case in the prong-horn. The proximal end is of subquadrate shape, the breadth and depth of the head being nearly equal and of the same dimensions as in the specimen of *Antilocapra* which has been employed for comparison. The hind cannon-bone clearly shows that the portion which articulates with the entocuneiform is the rudiment of the second metatarsal; mt. v is probably represented also, but this is not so obvious. The proximal portion of the shaft is narrow and deep; the groove on the anterior face is strongly marked and terminates distally in a large venous foramen.

Measurements.

	B. ANTILOPINUS.	A. AMERICANA.
	M.	M.
Femur, length (est.)	.252	.223
Tibia, length	.256	.256
Tibia, depth of proximal end	.046	.041
Tibia, depth of distal end	.037	.033
Tibia, width of distal end	.034	.030
Astragalus, length	.039	.032
Astragalus, width of distal end	.024	.021
Calcaneum, length	.084	.075
Calcaneum, length of tuber calcis	.051	.045
Cubo-navicular, breadth	.030	.027
Cuboid, height	.016	.017
Hind cannon-bone, width of proximal end	.025	.025
Hind cannon-bone, depth of proximal end	.024	.024

Restoration. In general appearance and size *Blastomeryx antilopinus* must have been very like the existing American antelope. The simple, straight and erect horns constitute one striking difference between the two species, and the fossil animal had heavier limbs, lacking the extreme lightness and elegance which are so characteristic of the prong-horn. In the latter the fore and hind legs are of nearly equal length, while in *Blastomeryx* the hind limbs must have been considerably longer than the fore. The differences are, however, less obvious than the resemblances.

Camelidæ.

POEBROTHERIUM Leidy.

Proc. Acad. Nat. Sci. Phila., 1847, p. 322.

The lower beds yielded a number of more or less fragmentary remains of this genus, the teeth showing perhaps a stronger tendency to assume the prismatic form than do the earlier species from the White River and Oregon beds.

PROTOLABIS Cope.

Proc. Acad. Nat. Sci. Phila., XXVIII, p. 145.

From the upper beds were obtained several specimens of small camels which should probably be referred to this genus. Only one of these is worthy of more than passing notice. This specimen is an axis (Pl. VI, Figs. 52, 53) which is of interest as demonstrating the mode of development of the spout-shaped odontoid in the camels. I have elsewhere shown that while *Procamelus* has a spout-like odontoid quite similar to that of the existing tylopodans, the White River *Poebrotherium* has a flat or semiconical process. In the specimen before us the margins have become slightly elevated, giving the process a somewhat concave upper surface and representing the same stage as that shown by the John Day genus, *Miohippus*, among the horses. So far as the odontoid process is concerned, the horses and camels thus form exactly parallel series, though all the steps of the change did not occur contemporaneously in both lines.

PROCAMELUS Leidy.

Proc. Acad. Nat. Sci. Phila., 1858, p. 89.

This genus is represented by a number of fragmentary specimens from the upper beds, but they add nothing whatever to our knowledge of the genus.

PROBOSCIDEA.

MASTODON PROAVUS Cope.

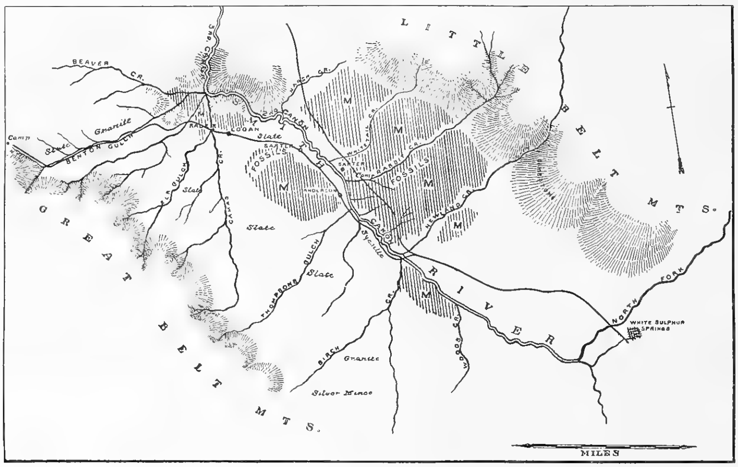
Synopsis of New Vertebrata from the Tertiary of Colorado, 1873, p. 10.

Some vertebræ and fragments of limb bones, which doubtless belong to this species, confirm Cope's statement that this is the oldest horizon containing *Mastodon* which has yet been found in America. The bones were found in position only in the uppermost beds, but loose fragments were found in the middle of the upper series. Except stratigraphically, these specimens are of no especial interest.

Summary.

It will be convenient to sum up briefly here the principal results of this investigation.

(1) The beds of the Deep River valley belong to two horizons, as originally pointed out by Grinnell and Dana. These horizons differ widely in lithological character and even more markedly in their contained fossils, and are almost certainly separated by an unconformity of erosion, which represents a considerable lapse of time. The lower series should be placed at the summit of the John Day and the upper at the base of the Loup Fork, where they form a well-marked subdivision (the Ticholeptus beds of Cope). This subdivision is not certainly known in other regions than the present one, and the deposits in Oregon, Nebraska and Wyoming which have been referred to it most probably belong to the Loup Fork proper.



MAP OF UPPER SMITH RIVER VALLEY, MONTANA.

Drawn by W. B. Harris from a sketch by O. C. Mortson.

(2) The nearest European equivalent of the upper Deep River beds appears to be the upper Miocene of Sansan and Simorre.

(3) In the genus *Cynodesmus*, which has the dentition of *Canis* combined with the skull and brain of the more ancient genera of the phylum, we find an important link in the genealogy of the dogs, leading back to the White River form, *Daphœnus*, through some as yet unknown genus of the lower John Day, which, however, must have been not unlike the so-called *Temnocyon josephi*. The abundance of Miocene

dogs in North America, contrasted with their absence or unimportance in Europe, renders it very probable that the family originated in the former continent.

(4) The name *Anchitherium* has been improperly applied to American equines from the White River and John Day, and should be replaced by *Mesohippus* and *Miohippus*, the latter genus extending through the John Day and into the Loup Fork.

(5) *Desmatippus* is a new genus of equines which nearly fills the gap between *Miohippus* and *Protohippus*, the molar teeth being intermediate in character between the two, brachyodont, and yet with a thin deposit of cement in the valleys.

(6) A quite unexpected discovery is that of a species of *Anchitherium*, of the type of the European *A. aurelianense.* The genus is very probably of American origin, and, as Schlosser and Mme. Pavlow have suggested, was almost certainly not in the direct line of equine descent, but it has paralleled the true horses in many interesting ways, such as the spout-shaped odontoid, etc.

(7) Surveying the series of equine genera, which there is such good reason to believe constitute an actual line of descent, we find a steady advance in differentiation in the main, accompanied by alternating progression and regression in minor details. It is also very probably true that a slight degree of specialization in a direction away from that taken by the main line, is not incompatible with a place in that line, as is exemplified by the peculiar character of the elbow joint in *Mesohippus*, which is greatly diminished in *Miohippus* and dies out in succeeding genera.

(8) Some of the accessory tubercles in both the American and European species of *Anchitherium* appear to favor the view of "indeterminate variation."

(9) The rhinoceroses of the Old World separated at a very early period from those of the New and cannot well have any common ancestor nearer than the Aceratheria of the Oligocene; the American series has, however, run parallel to the European in many important details of structure.

(10) *Mesoreodon*, a new genus of oreodonts from the lower beds, agrees with *Eporeodon* of the John Day in most characters of skull and dentition (though with some resemblances to *Merychyus*) while the feet are altogether like those of the latter genus. Very curious features of this genus are the presence of an ossified thyroid cartilage of the larynx, a rudiment of the bony clavicle and a metacromial process of the scapular spine. It is suggested that the large acromion of the artiodactyls, and its absence in even the Eocene perissodactyls, may be correlated with the earlier loss of the clavicle in the latter group.

(11) The skeleton of the oreodont genus, *Merycochœrus*, is now almost completely known, which permits exact comparison with other members of the group.

(12) *Merychyus* is probably to be derived from *Oreodon* through *Eporeodon* and

Mesoreodon; its resemblances to *Merycochœrus* are due to parallelism and not to relationship. Hence it is impossible to unite these two genera, as has been proposed.

(13) *Leptauchenia* is a White River genus, and the difficulty caused by supposing the three genera of this line to be contemporaneous thus disappears.

(14) A second and somewhat smaller species of *Blastomeryx* is described from the upper beds, and considerable portions of the skeleton show that this species was in size and general appearance very similar to the prong-horn antelope, though with many cervine features. The genus is shown to be closely allied to the European *Palæomeryx* and was doubtless derived from the Old World, nothing being known in the John Day or White River beds from which it could be descended. The peculiarities of the horns and the occipital region are such as to render it doubtful whether this genus can be ancestral to any existing form. At most, it may be so related to *Antilocapra.*

(15) The axis of *Protolabis* has an odontoid process which may be described as in the incipient stage of the spout-shape and corresponding to that of *Miohippus* among the horses. The evolution of this structure proceeded by exactly similar steps in the horses and camels and is to be correlated with the increasing length of the neck and the increased angle included between the axes of the cranium and of the cervical vertebræ.

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Explanation of the Plates.

Plate I.

Fig. 1. *Cynodesmus thoöides:* Skull, side view. × $\frac{3}{4}$. Lower beds of Deep River.
Fig. 2. " " Skull, top view. × $\frac{3}{4}$.
Fig. 3. " " Skull, front view × $\frac{3}{4}$.
Fig. 4. " " Superior dentition, crown view, natural size.
Fig. 5. " " Inferior dentition, crown view, natural size.
Fig. 6. *Miohippus annectens?* Marsh: Left femur, front view. × $\frac{1}{2}$. 6*a*, Proximal end of left femur.
Fig. 7. " " " Left tibia. *F*, fibula. 7*a*, Distal end of tibia and fibula, natural size.
Fig. 8. " " " Part of left pes, from inner side. × $\frac{2}{3}$. *C 1 + 2*, coalesced ento- and mesocuneiforms. Lower beds of Deep River.

Plate II.

Fig. 9. *Desmatippus crenidens:* Right upper molar-premolar series from the outer side. × $\frac{2}{3}$.
Fig. 10. " " The same, crown view, natural size.
Fig. 11. " " Left mandibular ramus, from outer side. × $\frac{2}{3}$.
Fig. 12. " " Left lower molar-premolar series, crown view, natural size. a, a^1, anterior pillars of Rütimeyer.
Fig. 13. " " Manus. × $\frac{1}{2}$.
Fig. 14. " " Right pes, from inner side. × $\frac{1}{2}$. *C 1 + 2*, coalesced ento- and mesocuneiforms.
Fig. 15. *Mesohippus Bairdi* Leidy: Specimen of left pes, showing the three cuneiforms coössified (*C 1 + 2 + 3*); natural size. White River beds of South Dakota.
Fig. 16. *Miohippus* sp.: Specimen of right pes, showing the very elongate and depressed ungual phalanx. × $\frac{1}{2}$. John Day beds of Oregon.
Fig. 17. *Protohippus* sp.: Portion of right manus. × $\frac{2}{3}$. *U*, ulna; *Sc*, scaphoid; *Cn*, cuneiform. Upper beds of Deep River.
Fig. 18. *Anchitherium equinum:* Atlas from ventral side. × $\frac{1}{2}$. Upper beds of Deep River.
Fig. 19. " " Fragment of axis, from the side. × $\frac{1}{2}$.
Fig. 20. " " Lumbar vertebra, from behind. × $\frac{1}{2}$.
Fig. 21. " " Proximal end of humerus. × $\frac{1}{2}$. *Bc T*, bicipital tubercle.
Fig. 22. " " Radius and ulna, distal end. × $\frac{3}{4}$.

Plate III.

Fig. 23. *Anchitherium equinum:* Skull, side view. × $\frac{1}{2}$. Upper beds of Deep River.
Fig. 24. " " Upper dentition, crown view. × $\frac{3}{4}$. *Cn*, cingulum of incisor.
Fig. 25. " " Lower dentition, crown view. × $\frac{3}{4}$.
Fig. 26. " " Humerus, front view. × $\frac{1}{2}$. *Bc T*, bicipital tubercle.
Fig. 27. " " Ungual phalanx of iii digit, from the side. × $\frac{2}{3}$.
Fig. 28. " " Phalanges of ii digit, from the side. × $\frac{2}{3}$.
Fig. 29. *Mesoreodon chelonyx:* Hyoid apparatus, natural size. *St H*, stylohyal; *Ep H*, epihyal; *C H*, ceratohyal; *G*, glossohyal process of basihyal; *Th H*, thyrohyal; *T C*, thyroid cartilage of larynx. Lower beds of Deep River.

Plate IV.

Fig. 30. *Anchitherium equinum:* Radius and ulna of left side, external view. × ½.

Fig. 31. " " Left manus. × ½. *Sc*, scaphoid; *Td*, trapezoid; *P*, pisiform, from the outside. The curvature of the metacarpals and the strong divergence of the lateral digits from the median are due to distortion.

Fig. 32. *Mesoreodon chelonyx:* Skull, rear view. × ⅗. Lower beds of Deep River.

Fig. 33. " " Left scapula of supposed female. × ⅗. *Mt*, metacromion.

Fig. 34. " " Block containing cervical and thoracic vertebræ, scapula, etc., referred to same individual as male skull (Pl. V, Fig. 35). *C 4*, *C 5*, *C 6*, fourth, fifth and sixth cervical vertebræ. *R 1*, *R 2*, first and second ribs of left side; *cl*, supposed rudimentary clavicle.

Plate V.

Fig. 35. *Mesoreodon chelonyx:* Skull of supposed male, side view. × ⅗. Lower beds of Deep River.

Fig. 36. " " Upper dentition of left side, crown view, natural size. Second individual.

Fig. 37. " " Left humerus, front view. × ⅗.

Fig. 38. " " Left ulna and radius. × ⅗.

Fig. 39. " " Right manus. × ⅗.

Fig. 40. " " Left manus, from inner side. × ⅗. *Tm*, trapezium.

Fig. 41. " " Right pes. × ⅗.

Fig. 42. " " Phalanges of third digit of pes, natural size.

Fig. 43. *Mesoreodon intermedius:* Mc. iii and mc. iv of right manus. × ⅗. Lower beds of Deep River.

Fig. 44. " " Phalanges of iii digit of pes, natural size. Second individual.

Fig. 45. *Merychyus zygomaticus* Cope: Skull of type specimen, from the side. × ⅗. Cope collection. The double infraorbital foramen is conjectural. Upper beds of Deep River.

Plate VI.

Fig. 46. *Mesoreodon chelonyx:* Pelvis, from ventral side. × ⅗.

Fig. 47. " " Left os innominatum. × ⅗.

Fig. 48. *Blastomeryx antilopinus:* Skull, from left side. × ½. Upper beds of Deep River. *F V*, facial vacuity, or fontanelle.

Fig. 49. " " Left radius and ulna, from the front. × ½.

Fig. 50. " " Cannon-bone of left manus. × ½.

Fig. 51. " " Right pes. × ½. *Cb + N*, coalesced cuboid and navicular. The cannon-bone is from a second individual.

Fig. 52. *Protolabis* sp.: Axis, from the side. × ⅗. Upper beds of Deep River.

Fig. 53. " " The same, front view. × ⅗.

ARTICLE III.

THE CLASSIFICATION OF THE OPHIDIA.

BY E. D. COPE.

Read before the American Philosophical Society, September 21, 1894.

Owing to the absence of limbs and other points in which diversity is usually apparent, the classification of the snakes has always presented difficulties to the zoölogist. An order which dates from Cretaceous time and has spread over the entire world, must have differentiated in structure, if its history has been like that of other orders of Vertebrata. Yet the researches of anatomists have only resulted in finding characters which define five suborders, and about a dozen families. Of the natural groups thus defined, one family, the Colubridæ, embraces three-fourths of the species, and is of cosmopolitan distribution. So long as this was the principal result attained, it remained clear that the stronghold of the order had not yet been taken.

The primary divisions above referred to are defined by peculiarities of the skeleton, and these were mostly originally described by Johannes Müller. In the preparation of their Herpetologie Générale, Duméril and Bibron made a full study of the dentition. The results they obtained were important, but they were very far from expressing an exact and clear-cut classification. The greatest defect of their definitions based on the teeth is that they too often fail to define. One type passes by easy gradations into another, so that in many cases it is impossible to determine what type a given dentition represents. In most cases it is clear that, among Colubrid snakes at least, no higher groups than genera can be predicated on dentition, and frequently not even these. Under such circumstances further structural characters had to be sought for if we are to have any clear idea of the affinities and phylogeny of this curious branch of the Reptilia. In any case, no systematic arrangement can be regarded as final until the entire anatomy is known.

In 1864 * I pointed out that certain snakes, notably the water snakes, have the

* *Proceedings Academy of Natural Sciences,* Philada.

vertebral hypapophyses continued to the tail, as in the truly venomous forms. Boulenger has since found this character in a good many forms which I had not examined and which have no affinity to the water snakes. This character, while important, presents the same evanescent stages in certain types that the dental characters before noticed exhibit. It had long appeared to me that the only prehensile organs possessed by serpents, the hemipenes, might probably present structural variations expressive of affinity or diversity. In 1893 * I examined these structures in many of the leading types and was gratified by the discovery of a great many structural characters. In fact these organs exhibit a variety of ornamentation and armature beyond any part of the anatomy in the Ophidia, and I am satisfied that they furnish more important indication of near affinity than any other part of these reptiles yet examined. No one hereafter can be sure of the place of a serpent in the system until the hemipenis has been examined.

Still another part of the structure remained to be studied. The assymmetry of the lungs of snakes had often been noted by anatomists, but very little was known as to the range of variation. Accordingly, when I undertook † a study of the pulmonary organs, I was able to confirm observations previously made by Schlegel and Stannius, and to correct some others, and to add a great number of facts as to species not previously examined. I give the details observed in the following pages. One result is that I am able to confirm the conclusion of Boulenger, *i. e.*, that the Colubriform venomous snakes, the Proteroglypha (cobras, Elapes, etc.), do not differ in any fundamental respect from the non-venomous Colubridæ, and that they cannot be characterized as a suborder. The suborders then are:

Catodonta (Type Glauconia).
Epanodonta (Type Typhlops).
Tortricina (Ilysiidæ and Rhinophidæ).
Colubroidea (Peropoda, Asinea, Proteroglypha and Platycerca).
Solenoglypha (Typical venomous forms).

I. THE HEMIPENIS.

The hemipenis is a projectile organ in the form of a hollow tube whose base is on one side of the middle line and which opens into the anus. When retracted it lies beneath the tail, extending for a greater or less distance, and terminating in a cylindrical muscle. This has considerable length and is finally inserted on a caudal vertebra. When the organ is projected this muscle is drawn forwards so as to evaginate the

* *American Naturalist*, 1893, p. 477 ; 1894, p. 831.

† *Proc. Amer. Philos. Soc.*, 1894, p. 217.

tubular organ. Thus the inside of the tube becomes the outside, and the entire organ projects freely from its base anteriorly. It finds its way into the corresponding oviduct of the female, and when once in place it cannot be retracted in most species without invagination. This is performed by the contraction of the now internal retractor muscle. This is inserted on the internal face of the apex, and draws it inwards, so that it soon assumes the original ensheathed position beneath the tail. It cannot be withdrawn from the oviduct without invagination, because it is generally set with strong bony spines which diverge backwards. They have a perfect grip on the walls of the oviduct and would, in some instances, lacerate that organ if the two bodies should be forcibly drawn apart. In other cases the hemipenis would be torn off at the base. Snakes sometimes partially project this organ, apparently in some instances for defense, as the spines are very pungent and are sometimes curved like cats' claws. Snakes are, however, very careful not to present these organs fully evaginated so as to expose the delicate structures near the apex. I have never seen this to be the case in an alcoholic specimen (with one possible exception), and I should judge that this was the general experience, from the figures given by authors.

The hemipenis of the Ophidia is traversed by a groove which divides the superficial investment to the internal integument (or external integument when the organ is retracted), which commences at the base internally and soon turns to the external side of the organ and continues to its extremity. This is the sulcus spermaticus (s s in Pl. XXVII). This sulcus is always bifurcated in venomous snakes, and I find it to be equally bifurcated in many harmless snakes (Figs. 2, 3, 7). The investing tissues may or may not correspond with this bifurcation. Thus the hemipenis may be more or less bifurcate (Figs. 1, 2, 7, 9, 10, 11). Schlegel states that it is bifurcate in venomous snakes, but it is not so in the sea snakes *Hydrophis* and *Hydrus*, nor in *Bungarus semifasciatus*, *Hoplocephalus coronatus*, etc., while it is bifurcate in many non-venomous forms. Next to the bifurcation of the sulcus in importance is the nature of the surface of the external investment (internal when retracted). In the most perfect types, both venomous and non-venomous, this surface is reticulate like tripe, the enclosed areas forming calyces, which may have a suctorial function (Figs. 6, 9, 10, 11). Their borders are often papillose, and are sometimes so deeply divided into papillæ as to lose their original character. These papillæ may be the seat of osseous deposit, becoming bristles or spines (sp), which become larger towards the middle of the length and lose their mutual membranous connections. These isolated spines may extend to the apex, but they rarely extend to the base. The surface may, however, be laminate and not reticulate, and the laminæ may be longitudinal (Figs. 4, 7) or transverse (Figs. 1, 2, 3, 5). In either of these cases they may not be spiniferous. The apex or apices of the organ may be furnished with a rigid papilla (Fig. 5) or awn, or a membranous disc.

In the Tortricina and Peropoda (the constrictors) the hemipenis is not spinous and the sulcus is bifurcate (Figs. 1, 2, 3), and in the Boidæ the hemipenis is bifurcate also, although in some genera (Xiphosoma, Ungualia) the branches are very short. The external integument is never reticulate, but is always laminate with elongate papillæ at the extremities, in Epicrates (Fig. 2), and Xiphosoma. The laminæ are pinnate from the sulcus as an axis in Morelia, Boa, Eunectes, Enygrus, Lichanura and Eryx, and are transverse (flounced) in Charina (Fig. 3). In Ilysia they are pinnate (Fig. 1), with a few longitudinal plicæ below. In the Colubroidea the majority of genera are calyculate and spinous. Nevertheless, the Calamarinæ are smooth or papillose, and certain Tropical American forms are disciferous instead of calyculate. Some are spinous to the tip. Among these, the Natricinæ have the spines minute, but their weakness is offset by the presence of a few large hooks at the base of the organ. The sulcus is either simple or bifurcate in the Colubroidea.

Gradations in the characters of the hemipenis similar to those found in the Colubroidea are to be seen in the types of venomous snakes. Thus in the Proteroglypha this organ is spinous to the tip, on a calyculate basis, in Hydrophis, Hydrus and Elaps. It is reticulate at the extremities and spinous below in Dendraspis, Adeniophis (*bivirgatus*), Naja (Fig. 9), Acanthophis, Bungarus and Sepedon, the apex with a smooth apex in the genus first named.

In Solenoglypha, in the genus Atractaspis, the apex is calyculate plicate and the remainder is spinous on a longitudinally laminate basis. In Causus the calyculate structure is well developed. In the Viperidæ and Crotalidæ the spines are on a flounced basis. The apices are calyculate in Bitis, Clotho (Fig. 10) and Vipera, and spinous in Cerastes. They are calyculate in Crotalidæ in Bothrops, Ancistrodon, Crotalophorus and Crotalus (Fig. 11).

The spines are not ossified in young snakes, and some may retain their flexible condition to half-grown dimensions. The calyces are also tenuous and lacking in papillæ in young individuals. Hence it is important that adults be selected for examination. It is useless to expect to find the organs projected in any number of alcoholic specimens; and when projected, the terminal portion is not everted, but the spinous portion only is exhibited. This part of the organ is apparently used sometimes for defense. I have also found that females are two or three times as abundant in collections as males, a fact which would indicate that they are more easily captured. I have failed, up to this writing, to secure males of a number of genera of which I have access to females, which accounts for their omission from this paper.

In examining the structure of the hemipenis the organ must be laid bare *in situ* and split lengthwise along the exposed (inferior) middle line before it is removed. This is necessary to avoid cutting it along the sulcus, which extends along the side.

II. THE PULMONARY STRUCTURES.

The condition of knowledge as to the lungs of snakes was stated by Stannius, in 1856, as follows: "The detailed accounts as to the single or double character of the lungs leaves much to be desired. Among Ophidia Angiostomata there possess a single sack, Rhinophis and all Typhlopidæ which have been examined; as to the Tortricidæ [Ilysiidæ] there are apparently species with two lungs (*T. xenopeltis*) [= *Xenopeltis unicolor*] and others with a single lung (*T. scytale*) [= *Ilysia scytale*]. Among Eurystomata, all the Peropoda (Boa, Python, Eryx) possess apparently two lungs, The Calamarina that have been investigated have one lung. Among Colubrina and Glyphodonta there are great variations. All the Coronellæ of Schlegel possess, according to Schlegel, a single lung. I find the lung single in *Rhachiodon scaber* [*Dasypeltis*]. *Tropidonotus natrix* [*Natrix vulgaris*] has a very small rudiment of a second lung. *Coluber* [*Spilotes*] *variabilis* possesses, according to Schlegel, the rudiment of a second lung. According to the statement of Meckel, this rudiment is common in Coluber. The Xenodons have, according to Schlegel, a single lung (*X. severus* and *X. rhabdocephalus*). In Heterodon I find a rudimental second lung. The Lycodons, according to Schlegel, possess a single lung, as also do Psammophis and Homalopsis. In *Dendrophis colubrina* Schlegel found the rudiment of the second lung. In Dipsas, according to Schlegel, there are variations; but he states that *D. multimaculata*, *D. lævis* and *D. annulata* [*Sibon annulatum*] have but one lung. The Achrochordina have but one lung. Among Hydrophidæ I found in three species of Hydrophis the lung-sack simple. Meckel states that Platurus has a very small rudiment of a second lung. Among the remaining poisonous snakes there is an insignificant rudiment of the second lung in the Elapina and Crotalina, while the Viperina possess an entirely simple lung." *

An examination of about one hundred and fifty species of nearly all types yielded the following results:

The snakes with rudimental posterior limbs (Peropoda) show in the character of their lungs what they show in the rudimental limbs themselves and in the hemipenis, the nearest relationships to the Lacertilia. They possess, with an exception to be noted later, two well-developed lungs, one of which is larger than the other. The

* Stannius, *Zootomie der Amphibien*, p. 108.

smaller lung lies to the right side and ventrally, while the larger one lies to the left side and dorsally. In some species the dorsal and ventral relation is more pronounced than in others. In the Colubroidea the right or ventral lung is generally present, but of very much reduced proportions, the usual size being from two to five millimetres in length. It is connected with the other lung by a foramen which perforates the tracheal cartilage at a point a little beyond the apex of the heart and opposite to the proximal part of the dorsal lung. It is sometimes connected to the dorsal lung by a short tube, in which cartilaginous half rings are seen in but two of the genera examined, viz., Heterodon and Conophis. The lumen of the rudimental lung may be lined by the same reticulate structure as is seen in the dorsal lung, or its walls may be smooth. In some Colubroidea the rudimental lung is absent, but such species are relatively few.

The dorsal lung may present proximally alongside of the trachea an auricle or pocket, and this is so developed in the genus Heterodon as to reach to the head without communication with the trachea other than that furnished by the normal portion of the lung. In the Solenoglypha, without exception, this extension of the dorsal lung is present, and extends to the head, and its lumen is continuous with the trachea throughout its length. The same structure exists in the genera Hydrus and Hydrophis, and also in the West Indian peropodous genus Ungualia, which differs besides from other Peropoda in having but one posttracheal lung. Finally the tracheal lung, as I have called it, is distinct from the true lung in the water snakes Platurus and in Chersydrus. In the former of these genera the trachea is not separate from the lumen, while in Chersydrus it is distinct. It, however, communicates with the cells of which the lung consists in this genus by a series of regularly placed foramina on each side. There is no lumen in the tracheal lung of Chersydrus. In the blind burrowing Typhlops we have a still further modification of the tracheal lung. It is without lumen, and is composed of coarse cells of different sizes. These have no communication with the trachea or lung that I can discover. It has occurred to me that this structure, which extends from the heart to the throat, may not be a pulmonary organ.

I have referred to the dorsal and ventral positions of the two lungs. The rudimental lung is to the right of the dorsal lung in the Colubroidea, but in the Ilysiidæ it is to the left. It is quite questionable which lung this rudiment in this family really represents. In the Typhlopidæ the single lung is on the right side and extends from the heart to the liver. It has the position of the rudimental lung of the Colubroidea and may represent it. I cannot decide this question without further material. In Glauconia there is but one true lung, and this is ventral in position and originates to the right of the heart, so that in this genus also it may represent the rudimental lung of the Colubroidea. There is here no tracheal lung or organ.

The rudimental lung is often concealed from view and difficult to discover. The best test of its presence is the foramen which connects it with the trachea, which will generally be found piercing the cartilage of the latter near the apex of the heart. The rudimental organ may then be found by inserting a bristle and observing its destination through the more or less transparent tissues. In but one instance have I found a rudimental lung without a connecting foramen, viz., in the Mexican *Ficimia olivacea*. On the other hand, the foramen may terminate in a small blind sac.

The pulmonary characters may be determined without much dissection. The position of the heart must be first ascertained and a longitudinal median incision made in the abdominal wall. In all forms except the Epanodonta and Catodonta the trachea will be found passing to the left side of the heart and entering the lung near its apex. By splitting the trachea, not too near its abdominal border, on turning the free margin upwards as the snake lies on its back, the *foramen bronchiale* will be seen and its lumen can be explored. The trachea is concealed by the œsophagus, which must be drawn to the left side of the body in order to make the examination. The examination of the tracheal lung requires the division of the abdominal wall further towards the head.

The tracheal lung greatly extends the surface available for blood aëration. This is useful to snakes for the reason that the huge masses of food which they ingest so compress the true lung that another organ is necessary. Most snakes, whether they have a tracheal lung or not, have the pulmonary organ greatly elongated, so that while one portion is compressed by the contents of the alimentary canal another part is free to function. The tracheal lung enables the snake to inflate the anterior part of the body. This is conspicuous in the true venomous species (Solenoglypha). In the same way Heterodon inflates its huge diverticulum. In the marine water snakes Acrochordus and the Hydrophidæ these organs serve as floats. In the fresh-water snakes (Natricinæ) there is no tracheal lung.

III. HISTORY AND ACKNOWLEDGMENTS.

The first paper which called attention to the importance of the penial characters as indications of affinity in the Ophidia was published by me in the *American Naturalist* for December, 1893. The relations of the pulmonary structures to the systematic relations of the Ophidia were first pointed out by me in a paper published in the *Proceedings of the American Philosophical Society* for June, 1894. In the *American Naturalist* for October, 1894, I published an amended classification of the two sub-families, Xenodontinæ and Philodryadinæ. In the *Proceedings of the Philadelphia*

Academy I published, in January, 1895, descriptions of the penial characters of several genera which I had not previously observed. The present memoir presents a number of modifications of the system as proposed by me in 1893. I have ceased to regard the more important penial structures observed as definitive of families, but rather of subfamilies. I have come to regard the flounced structure as of less importance than at first appeared, and I find it to be characteristic of genera and groups of genera only. On the other hand, I find the disciferous type to be quite distinct from all others and distinguish by it two subfamilies, the Xenodontinæ from the Dromicinæ, and the Erythrolamprinæ from the Philodryadinæ. I have combined the supposed Pseudaspidinæ with the Lycodontinæ. I have found the genus Chrysopelea to resemble the Dipsadinæ more closely than I had at first thought and have cancelled the supposed subfamily Chrysopelcinæ.

In preparing this memoir I have examined material belonging to the Museum of the Academy of Natural Sciences of Philadelphia, to the United States National Museum, and to the Philadelphia Museums, to whose officers my thanks are especially due. I wish to acknowledge also my indebtedness to Prof. Alexander Agassiz for the opportunity of examining some Australian species; to Prof. Charles S. Dolley for a collection from Hainan, China; and to Prof. Wright, of Oberlin, O., for a small but valuable collection from So th Africa; to Mr. George K. Cherrie for a fine series from Costa Rica, and Drs. Ferrari-Perez, Bernad, Dugès and Villada for Mexican species. To Messrs. J. B. Wood and George Pine I am indebted for collections from Florida; to Prof. W. T. Cummins for material from Texas; and to Dr. Jos. Corson, U. S. A., for specimens from Mobile, Ala. I am also especially indebted to the Zoölogical Society of Philadelphia and its Superintendent, Mr. Arthur E. Brown, for specimens from the Gardens.

IV. SYSTEMATIC CONCLUSIONS.

Diversity of lung structure accompanies the primary groups which are characterized by peculiarities of the skeleton to such a degree that we are warranted in according it a high systematic value. Thus angiostomatous and peropodous snakes have two lungs, while the Colubroidea have one and a rudiment, and the Solenoglypha always have a tracheal lung. Exceptions and variations from these rules thus become of importance. Thus I have no doubt of the propriety of the separation of the Ungualiidæ from the other Peropoda, on account of its pulmonary characters. Nor is there any doubt in my mind of the necessity of the separation of the Leptognathinæ from the Dromicinæ, on account of its large tracheal lung. The very marked characters of the genus Acrochordus characterize the family, as well as the osteological features. It remains to be seen whether the family I termed the Nothopidæ, but which Boulenger unites with the Acrochordidæ, agrees with it in pulmonary characters. The remarkable tracheal lung or gland distinguishes the Epanodonta from the Catodonta, emphasizing the differences observed in the osteology of the skull. The huge diverticulum of Heterodon serves to distinguish the genus from its allies. The extraordinary transverse dilatation of the trachea in Thrasops establishes the genus as distinct.

The value of the rudimental right lung as a character of the Colubroidea is increased by my investigations. In only two genera have I found it present or absent, viz., Halsophis and Pityophis. I am not sure but that I may yet find it in the *P. melanoleucus*, where I have failed hitherto, but I am sure that it is present in some species of Halsophis and wanting in others. A natural group of American Colubrinæ appears to be characterized by its absence, viz., Rhinochilus, Cemophora and Ophibolus, all genera with an entire anal shield. The development of cartilages in the bronchial foramen or tube of the rudimental lung, is not a constant character. I found it in one *Heterodon platyrhinus* and not in another; it is present in *Conophis pulcher*, but absent in *C. sumichrastii.*

The numerous characters presented by the hemipenis have various values. Several very distinct types are distinguishable, but they are continuous at some point through intermediate forms. This is, however, the history of all characters which distinguish organic beings, especially of those which have been relied on as characters of the minor divisions and genera of the Ophidia. The characters which I have discovered in the hemipenis have added greatly to our resources in the attempt to learn the relationships and hence origin of the members of the Ophidia.

In a broad way we may distinguish as leading types the following: The smooth, the plicate or flounced, the calyculate or ruched, and the disc-bearing. Any of these may have the sulcus spermaticus simple or bifurcate, and they may have the middle part of the organ spinous or not. The spines may extend to the apex so as to obliterate the pattern, and the total organ may be bifurcate or not. As regards the indications of affinity presented by these types, it may be said that the nearer we approach the Lacertilia the less spinous is the organ, and the farther away the form the more certainly will the ruched structure prevail. The tendency to bifurcation is present in most groups, but it is universal in but one suborder, the Solenoglypha, or specialized venomous snakes.

In the Oriental region we have the smoothest type of Colubroidea, which includes the genera really allied to Calamaria, many of which have had hitherto widely different positions in the systems. Owing to the scarcity of specimens of this type in

American museums, I have not been able to investigate them fully. The great Colubrine division is remarkably constant in its undivided sulcus and abundant calyces. In degenerate types the calyces become less numerous. The groove-toothed Dipsadines have the same structure. Except one Australian genus (Acanthophis), all the disciferous types are Neotropical, and all have a double sulcus. The other Neotropical types with double sulcus may be calyculate or spinous, and they present a great variety of detail. Here again the glyphodont and aglyphodont types are quite parallel to each other. The structure in the water snakes is again different and characteristic. The organ is feebly spinous from the base to or near to the apex, possessing no calyces, disc or transverse plicæ, and the prehensile function is maintained by one or a few large hook-shaped spines at the base. In 1864 I referred several genera which had been placed in the Calamarinæ to the water snakes on account of the continuation of the hypapophyses to the tail. I was much gratified on examining their hemipenis to find that they (genera Tropidoclonium, Virginia and Haldea) present exactly the characters of group to which the vertebræ indicated that they should be referred. On the other hand, the characters of the hemipenis in Ablabes (*baliodirus*) led me to suspect that it possesses the vertebral characters of the Natricinæ, and on examination this proved to be the case. In like manner I have been able to refer genera supposed to belong to the Calamarinæ to almost every natural division of the Colubroidea by the study of the hemipenis. The old Calamarinæ of authors is simply an aggregation of burrowing or degraded forms of several natural groups.

The Natricine (water snake) group is connected with the groove-toothed water snakes (Homalopsinæ), and both of these groups pass probably into the Lycodontine series, in the typical forms of which the spines are arranged in flounces. It is difficult as yet, and perhaps may not become easy, to distinguish some members of the Lycodont group from certain ground snakes with totally spinous hemipenis, especially certain African genera, as Elapops, Grayia and others. These questions remain for future research.

I have found the characters of the hemipenis as constant as those of any other part of the organism. Occasional irregularities are to be looked for, but the only one which I have met with is in the case of a specimen of *Boaodon infernalis* from South Africa, in which the hemipenis is shortly bifurcate on one side and not so on the other. There is a tendency to bifurcation in some individuals of *Ophibolus getulus* which is not conspicuous in others. It is a tendency only. There are seen in many species of all groups with calyces, ribs or welts having a longitudinal direction. On these the calyces are crowded and closed, and they are sometimes rudimental or distorted. I have not yet ascertained the constancy of these structures in species and genera, excepting when they occur as borders of the sulcus spermaticus, where they are constant. These must not be confounded with temporary longitudinal folds of the structure, which can be removed by stretching.

I now give the exact definitions of the divisions as far as definable with present information. The definitions of the suborders are those of Müller, modified by myself.* An examination of the osteology of the skull led me, in 1859,† to place the genera Causus and Atractaspis in the order Solenoglypha. The former had been placed in the Proteroglypha by Duméril and Bibron, and the latter was made the type of a family "with permanently erect fangs" as division C of the second section of the Ophidia, the "Colubrinæ," by Günther.‡ My arrangement has been adopted by all later authors.

Authors have differed as to the homology of the bone which supports the quadrate in the Ophidia. Huxley§ has identified it as the element he called squamosal in the Lacertilia, a conclusion to which I have demurred ‖ for two reasons. The first of these is that this element is one of the bones of the brain-case in the Angiostomatous snakes, where it is intercalated between the exoccipital, parietal and petrosal. The second is, that the bone called by Huxley squamosal in the Lacertilia has no such intercalary relation, but is one of the segments of the primitive roof of the temporal fossa. In the degenerate snakelike forms of the Lacertilia this element disappears, and I believe that it does not exist in the Ophidia. I add that I agree with those osteologists who do not regard it as the homologue of the squamosal of the Mammalia, and who give it the name, after Owen, of supratemporal.¶

If we now remove the supratemporal from the skull of a Lacertilian we have the condition which exists in the Ophidia. We observe beneath the position of its posterior end, and between the exoccipital, parietal and petrosal, an element which corresponds with the bone in question in the Ophidia. This element has received various names, among the rest that of squamosal. I think I have shown, however, in view of the characters which it presents in the Pythonomorpha, that it is the paroccipital. By the lengthening of the exoccipital in the Lacertilia the paroccipital has been carried far from the brain-case and supports the quadrate behind. By its elongation posteriorly it has carried the quadrate posterior to the other bones of the skull in the Eurystomat-

* *Proceeds. Academy Philada.*, 1864, p. 230; *Proceeds. Amer. Philos. Soc.*, 1886, p 479.

† *Proceeds. Academy Philada.*, 1859, p. 335.

‡ *Catal. Colubrine Snakes* Brit. Museum, 1858, pp. 1 *et* 239.

§ *Anatomy of Vertebrated Animals*, 1872, pp. 189 and 203.

‖ "On the Homologies of the Cranial Bones of the Reptilia," *Proceeds. Amer. Assoc. Adv. Science*, 1871, pp. 174 and 217.

¶ *Transactions Amer. Philos. Soc.*, 1892, p. 20.

ous Ophidia. Huxley called the paroccipital of the Reptilia the opisthotic, hence in my first determination (in 1871) I used the latter term for it in the Ophidia.

A. Paroccipital intercalated in the cranial walls (*Angiostomata*).

* No ectopterygoid ; palatines bounding choanæ posteriorly ; ethmoturbinal forming part of roof of mouth ; rudiments of pelvis ; two lungs.

I. Maxillary bone fixed to prefrontal and premaxillary ; a pubis............................CATODONTA.

II. Maxillary bone vertical and free from all others ; no pubis ....EPANODONTA.

** An ectopterygoid ; palatines not bounding choanæ posteriorly.

III. Maxillary bone free, horizontal ....TORTRICINA.

B. Paroccipital attached scale-like to cranial walls and produced freely ; ectopterygoid present (*Eurystomata*).

IV. Maxillary bone horizontal, not forming a ginglymus with prefontal..................COLUBROIDEA.

V. Maxillary bone vertical and articulating with the prefrontal by a ginglymus ; a tracheal lung. SOLENOGLYPHA.

Within these suborders the pulmonary characters define superfamilies and families. The penial characters, as already remarked, have various values, generally defining subfamilies and genera or groups of genera. These are given in the analytical tables under the family and subfamily heads. On examining these tables it will be seen that the genera brought into close juxtaposition are frequently not most closely allied in general appearance. *The keys are chiefly intended to present the penial characters, and do not always display the serial or other relationships of the genera among themselves.* The intimate filiations of the genera among themselves are not yet sufficiently well known to make it possible to do otherwise at present.

EPANODONTA.

I have nothing to add to what has been already stated regarding this suborder (p. 191).

CATODONTA.

What is known of this suborder has been already mentioned (p. 191).

TORTRICINA.

In Ilysia the hemipenis is deeply bifurcate and the surface of each branch is flounced. The flounces are oblique to the sulcus and are spineless. Below the bifurcation the surface is smooth, excepting a wart (Plate XIV, Fig. 1).

COLUBROIDEA.

Five well-marked divisions are embraced in this suborder, as follows :

I. Chevron bones open inferiorly.

Rudimental pelvis and posterior limbs ; no grooved teeth ; generally two lungs.............PEROPODA.

No rudimental pelvis or limbs nor grooved teeth ; one lung rudimental..............AGLYPHODONTA.

No rudimental pelvis or limbs; a posterior maxillary tooth or teeth, grooved; one lung rudimental. GLYPHODONTA.

No rudimental pelvis or limbs; an anterior tooth with tube for poison duct; one lung rudimental. PROTEROGLYPHA.

II. Chevron bones complete, the lateral halves united below.

No rudimental limbs; a tubular tooth in front of mouth; one principal normal lung and a tracheal lung........PLATYCERCA.

It is questionable whether the Aglyphodonta and Glyphodonta should be retained as distinct from each other. Most of the penial characters found in the one occur in the other, and it remains to ascertain whether these, or the grooving or not of the teeth, are to be considered to be of primary importance. For the present I follow the example of Duméril and Bibron and Boulenger.

PEROPODA.

I find here three distinct families, as follows:

Two pulmonary lungs, no tracheal lung; nasal bones distinct; a coronoid bone: hemipenis plicate. *Boidæ.*

Two pulmonary lungs; no tracheal lung; nasal bones coössified; no coronoid bone; hemipenis plicate........*Charinidæ.*

One pulmonary lung, a tracheal lung; two nasal and a coronoid bone; hemipenis smooth..* *Ungualiidæ.*

Boidæ.

Within this family the characters of the hemipenis vary considerably. The plicæ are more or less undulate, and in some genera they fuse at intervals, producing pockets which sometimes approach the character of calyces. The sulcus and generally the entire organ are bifurcate. The plicæ may also be represented at the apex by distinct papillæ. The genera which I have examined present the following characters:

I. Sulcus double.

a. Hemipenis single.

Plicate and not papillose........† *Eryx* Daud.

aa. Hemipenis furcate.

Entirely plicate........‡ *Boa* Linn; § *Eunectes* Wagl.

More or less pocketed........{ ‖ *Lichanura* Cope. ¶ *Python* Daud. ** *Enygrus* Wagl. }

Apex papillose........†† *Epicrates* Wagl.

II. Sulcus single.

Apex papillose........‡‡ *Chilabothrus* D. and B.

The sulcus in the *Chilabothrus striatus* examined is divided for a short distance when the branches reunite; Pl. XV, Fig. 3.

* Cope, *Proceeds. Amer. Philos. Soc.*, 1894, p. 220.

† *E. jaculus.* ‡ *B. constrictor.* § *E. murinus.* ‖ *L. trivirgata.*

¶ *P.* (*Morelia*) *argus.* ** *E. carinatus.* †† *E. angulifer.* ‡‡ *C. striatus.*

Several forms of this family I have not been able to examine, as Chondropython, Sanzinia, Bolieria, Trachyboa, etc.

Charinidæ.

In Charina the sulcus is bifurcate, but the organ is simple. The surface is plicate, the plicæ distant towards the apex, and the apex smooth (Pl. XIV, Fig. 3).

Ungualiidæ.

In Ungualia there are no plicæ, and in *U. melanura* there are only four small papillæ symmetrically arranged. The sulcus and organ are furcate (Pl. XV, Fig. 8).

AGLYPHODONTA.

The three families of the Aglyphodonta are defined as follows:

Two pulmonary lungs; no tracheal lung; a coronoid bone................................*Xenopeltidæ.*

One pulmonary lung and a tracheal lung; no coronoid bone; postfrontal bone produced forwards over the orbit..*Acrochordidæ.*

One pulmonary lung, with a rudiment of a second; rarely a tracheal lung; no coronoid bone; postfrontal bone not produced over orbit..*Colubridæ.*

I have been unable to determine the penial structure of the only species of the **Xenopeltidæ,** the *Xenopeltis unicolor* Reinwt. as all of the four individuals accessible to me are females.

Acrochordidæ.

There are two subfamilies of this family.

No gastro- or urosteges..*Achrochordinæ.*

Of the members of this subfamily I have only examined the hemipenis of *Acrochordus javanicus* and *A. granulatus* Cuv. This is bifurcate but not deeply, and the surface below the bifurcation is smooth. The branches are delicately and not closely spinous (Pl. XV, Fig. 13). It is not certain that the Nothopinæ belong to this family or to a distinct one; the cranial structure is identical. They differ from the Achrochordinæ as follows:

Gastro- and urosteges present..*Nothopinæ.*

Colubridæ.

The natural divisions of this family are clearly indicated by the characters of the hemipenis for the greater part. The characters of the vertebræ cannot, however, be neglected; and the dentition, in a general way, corresponds with the results thus attained. Thus the type of penis with simple sulcus and well-developed ruches includes the large isodont ground snakes and their allies, a very few of which (Zamenis *sp.*) are diacranterian. The types with furcate sulcus with ruches or disc are nearly always diacranterian in dentition. The Natricine hemipenis is always associated with continued vertebral hypapophyses. The smooth or plicate hemipenis is very seldom associated with such hypapophyses.

I repeat here in the main the groups indicated in my prodromus of 1893, with the omission of the glyphodont genera. As I have not had access to some of the Oriental and African genera, it may be necessary to introduce some changes into some of the groups which include them.

I. Hypapophyses restricted to the anterior part of the vertebral column.

a. No tracheal lung.

Hemipenis spineless, smooth, plicate or papillose only.................................... *Calamarinæ.*
Hemipenis with apical disc; no calyces; spinous; sulcus furcate.......................... *Xenodontinæ.*
Hemipenis calyculate, spinous; sulcus furcate; no disc.................................... *Dromicinæ.*
Hemipenis calyculate, spinous; sulcus simple; no disc.................................... *Colubrinæ.*

aa. A tracheal lung.

Hemipenis as in Dromicinæ... *Leptognathinæ.*

II. Hypapophyses present to the caudal region. Hemipenis without calyces.

Hemipenis smooth, not spinous... *Anoplophallinæ.*
Hemipenis spinous, without enlarged basal hook.. *Lycodontinæ.*
Hemipenis minutely spinous, with enlarged basal hook or hooks.......................... *Natricinæ.*

CALAMARINÆ.

The genera of this group are of various external form and the hemipenis presents considerable variety of structure.

I. Fusiform.

Hemipenis smooth, simple; sulcus furcate...* *Calamaria* Boie.
Hemipenis transversely plicate; sulcus simple; extremity with two papillæ............† *Oligodon* Boie.
Hemipenis smooth or nearly so; apex membranous; sulcus simple...................‡ *Holarchus* Cope.
Hemipenis similar to Holarchus, but sulcus furcate.................................§ *Dicraulax* Cope.

II. Colubriform.

Hemipenis single, apex papillose.. *Grayia* Gthr.

III. Dipsadiform.

Hemipenis bifurcate, with papillæ at the middle, and smooth apex..........................‖ *Pareas.*

It is probable that several genera allied to Calamaria resemble it in characters, and that Simotes D. and B. belongs near to Holarchus. From their general resemblance it is also probable that Anoplodipsas Pet. and Amblycephalus Kuhl belong near to Pareas. The subfamily is entirely Oriental, except Grayia, which is African.

* Species examined: *C. gervaisii.* † *O. subquadratus.* ‡ *H. ancorus, H. dolleyanus.*
§ *D. purpurascens trinotatus.* ‖ *P. moellendorffii* Boettg.

XENODONTINÆ.

After the subtraction of the Dromicinæ, a limited number of genera are referable here. They are all Neotropical.

φ. Rostral plate not recurved.

Hemipenis undivided; no scale-pits.......... *Aporophis* Cope.
Hemipenis divided; no scale-pits.......... *Opheomorphus* Cope.
Hemipenis divided; one scale-pit..........* *Xenodon* Boie.

φφ. Rostral plate recurved.

Hemipenis divided; one scale-pit.......... *Lystrophis* Cope.

DROMICINÆ.

A. No proximal diverticulum of the left lung.

I. Hemipenis transversely plicated (divided); (Flabellati).

Plicæ not papillose; diacranterian; colubriform.......... *Helicops* Wagl.
Plicæ not papillose; isodont; fusiform.......... *Pseudoeryx* Fitz.
Plicæ papillose; isodont; fusiform.......... *Rhabdosoma* D. & B.

II. Calyculate and not capitate (Calyculati).

φ. Hemipenis undivided.

Fusiform; isodont.......... *Carphophiops* Gerv.
Colubriform; isodont; two nasals.......... *Diadophis* B. & G.
Colubriform; diacranterian; one nasal.......... *Amastridium* Cope.
Colubriform; diacranterian; two nasals.......... *Hypsirhynchus* Gthr.

φφ. Hemipenis double.

Fusiform; isodont.......... *Farancia* Gray.
Colubriform; diacranterian; no scale-pits.......... *Dromicus* Bibr.
Colubriform; diacranterian; one scale-pit..........† *Monobothris* Cope.
Colubriform; diacranterian; two scale-pits.......... *Halsophis* Cope.

III. Capitate (or pocketed at base of calyculate portion) (Capitati).

φφ. Hemipenis undivided.

Scale-pits single; scales smooth.......... *Pliocercus* Cope.
No scale-pits; scales smooth.......... *Rhadinæa* Cope.
Scales keeled; prenasals in contact.......... *Tretanorhinus* D. & B.

φφ. Hemipenis divided.

Rostral normal; isodont.......... *Ninia* B. & G.

IV. Calyculate with spinous bands to apex (Calycispinosi).

Hemipenis bifurcate; spines not ossified to apex; diacranterian; colubriform......‡ *Tæniophallus* Cope.
Hemipenis bifurcate; subisodont; attenuate.......... *Uromacer* D. & B.

V. Exclusively spinous to apex; (diacranterian) (Spinosi).

Anterior teeth wanting.......... *Enulius* Cope.
Anterior teeth present; internasals fused; fusiform..........§ *Hydrops* Wagl.
Anterior teeth present; anal divided; no scale-pits; colubriform; not bifurcate...‖ *Echinanthera* Cope.
Anterior teeth present; anal entire; one scale-pit; colubriform; bifurcate.......... *Acanthophallus* Cope.

AA. Left lung with a proximal diverticulum extending to the throat.

VI. Calyculate and capitate.

Rostral recurved; hemipenis divided; diacranterian.......... *Heterodon* Beauv.

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* Includes Liophis Wagl.
† Type *Dromicus chamissonis* Auct.
‡ Type *Lygophis nicagus* Cope. Pockets separate the spinous bands from the calyces.
§ *H. martii* Wagl. examined.
‖ Type *Aporophis cyanopleurus* Cope.

The species of this subfamily are all American and mostly Neotropical. The following genera are found in the Nearctic fauna: Carphophiops, Diadophis, Farancia, Rhadinæa (*Dromicus flavilatus* Cope, from the Southeast Atlantic region, belongs to this genus: Pl. XXVII, Fig. 6), Heterodon. Of these all are characteristically Nearctic, except Rhadinæa, which is Neotropical. I have given a synopsis of the genera of Dromicinæ in the *American Naturalist* for October, 1894, p. 840.

LEPTOGNATHINÆ.

The three genera of this family are distinguished as follows:

Gular region with two longitudinal pairs of plates ....*Petalognathus* D. & B.
Gular region with numerous paired plates.......................................*Leptognathus* D. & B.
Gular region with a median plate...*Mesopeltis* Cope.

The hemipenis in the subfamily Leptognathinæ is not bifurcate, but the sulcus is deeply so. It is calyculate from the bifurcation of the sulcus to the extremity and the calyces are fringed. Below them the organ is furnished with hooked spines half way to the base. Below these the surface is smooth. In *Mesopeltis sanniolus* the calyces have longer papillæ than in the other species which I have examined.

COLUBRINÆ.

This subfamily includes representatives of the Calamarinæ, Coronellinæ, Lycodontinæ, Colubrinæ and Dryadinæ of authors, and includes burrowing, ground and arboreal types. The group is especially characteristic of Palearctica and Nearctica, but numerous forms occur also in the Oriental, Ethiopian and Neotropical realms. There is a general similarity in penial structure, the diversities being of minor importance, and some of them not yet fully understood. I have been able to abolish the division Coronellinæ, which never had any real standing, and also to show that Hallowell was right when he referred the *Lycodon rufozonatus* of authors to the neighborhood of Coronella. The genera of burrowing habits and generally small size which were variously referred to the Calamarinæ and Coronellinæ, generally have the ruching of the hemipenis reduced and replaced by spines. This is conspicuous in Stylosoma and especially in Conopsis, where there is but one row of calyces, and in Adelphicus and Trimetopon, where the cups are replaced by unossified papillæ. In the species of Ophibolus the calyces are much reduced in number and replaced by spines. Some genera have the borders of the calyces conspicuously papillose, while in others they are smooth, but intermediate conditions connect them. In some forms there are smooth patches on the apex of the organ, but the value of this character is uncertain. In Cynophis I have found a remarkable apical awn, but as I have had the opportunity of examining but one individual, I am not sure how constant it is. In the *Tropidoclonium lineatum*, where a similar character is present, I have found it to be entirely constant.

Boulenger distinguishes two principal divisions of ground Colubridæ as genera, under the names Zamenis and Coluber, on dental characters. In the former the maxillary teeth increase in size posteriorly, while in the latter the posterior teeth are not longer, and may be shorter than the anterior. That this distinction is valid in many instances is well known, but it is admitted by Boulenger that in other instances the transitions are complete. An examination of the penial characters leads me to the opinion that each of these groups is a series of genera rather than a single genus. Thus in the *Zamenis gemonensis*, the type of the genus, we have the normal colubrine structure, from which two divergent lines may be traced. In one of these, represented by the *Z. ventrimaculatus*, the calyces preserve their character, but the few papillæ are ossified as acute spines, the character defining the genus Acanthocalyx. In another direction the walls of the calyces are thickened and support several series of papillæ. This is seen in the *Z. ravergierii*. In the next type these numerous papillæ are ossified, giving us the genus Gonyosoma. A greater modification is seen in the *Z. florulentus*. Here the thickening of a part of the calyx walls is greatly increased, while other walls, including all of the longitudinal ones, disappear. The result is a mass of papillose pads, a character quite different from anything else in the order, and one which defines the genus Tylanthera. The explanation of this structure is rendered possible by that of the *Zamenis ravergierii* (Pl. XVI, Fig. 4).

The North American species referred to Zamenis by Boulenger have been separated under the name Bascanium by Baird and Girard. Most, if not all, of these species differ from the typical *Zamenis gemonensis* in possessing one or two large hooks at the proximal part of the spinous tract (Pl. XVIII, Fig. 1) which remind one of the Natricinæ, and which are not found in the typical forms of Zamenis.* The *Drymobius pulcherrimus*† Cope possesses a similar peculiarity, which separates it from the typical species of that genus. It differs from the species of Bascanium, however, in having the large spines distad to the spinous tract and not proximad (Pl. XVIII, Fig. 4).

In the species of Coluber there are distinct naked tracts or bands extending more or less downwards from the apex (Pl. XVI, Fig. 2; Pl. XXI, Fig. 3). There is one strongly pronounced in *C. emoryi* and there are two less extensive in *C. obsoletus*.

*This character is present in *B. flagelliforme*, *B. laterale*, *B. mentovarium* and *B. mexicanum* (Zamenis D. & B.). In *B. constrictor* it is sometimes present and sometimes absent (see Pl. XIV, Fig. 6).

†The species figured and described by Bocourt (*Miss. Sci. Mexique*, p. 725, Pl. XLIX, Fig. 3) under this name is quite distinct. It is much larger, has but two preoculars, four bands instead of two, and is olive and brown instead of black and white with a green head. I propose to call it *Drymobius lemniscatus*.

I give the following synopsis of the genera so far as I have been able to examine them:

I. Hypapophyses not piercing œsophagus.

* Apical calyces of hemipenis present.

A. Calyces with the borders spinous.

Spines at angles of calyces only ; colubriform ; scuta normal ; teeth longest posteriorly. **Acanthocalyx* Cope.

Spines numerous, bordering the calyces ; colubriform ; scuta normal ; teeth equal.... *Gonyosoma* Wagl.

AA. Calyces with spines on the internal walls.

Calyces numerous, fringed ; scuta normal ; one nasal plate......................... † *Entechinus* Cope.

AAA. The calyces, excepting the inferior marginal ones, not furnished with spines.

α. No apical awn or papilla.

β. Calyces normal ; *i. e.*, small and deep.

γ. Hemipenis not capitate.

δ. Calyces mingled with large pockets.

Isodont ; attenuate ; ventrals keeled .... *Dendrophis* Boie.

δδ. Calyces without large pockets ; ventrals not keeled.

ε. Rostral normal or compressed ; pupil round.

ζ. Anterior teeth not longer than posterior.

η. Two median rows of scales.

Colubriform ; isodont ; anal double... ‡ *Herpetodryas* Boie.

Colubriform ; isodont ; anal single... § *Spilotes* Wagl.

ηη. One median row of scales.

θ. Trachea enormously expanded transversely.

Subisodont ; dipsadiform.. *Thrasops* Hallow.

θθ. Trachea normal.

ι. Calyces numerous, fringed.

κ. One nasal plate.

Isodont ; colubriform ; anal divided .... *Cyclophis* Gthr.

Isodont ; coronelliform ; anal divided.. *Contia* B. & G.

κκ. Two nasal plates.

Anal divided ; no epiglottis ; attenuate... *Leptophis* Bell.

Anal divided ; no epiglottis ; colubriform ; teeth longer posteriorly...................... *Zamenis* Wagl.

Anal divided ; no epiglottis ; colubriform ; teeth equal................................... *Coluber* Lin.

As Coluber, but anal entire .... ‖ *Compsosoma* D. & B.

As Compsosoma, but rostral prominent and compressed............................... *Rhinechis* Wagl.

As Compsosoma, but an epiglottis... *Epiglottophis* Cope.

Anal entire ; rostral prominent, produced backwards ; four prefrontals ; an epiglottis... *Pityophis* Holbr.

Anal entire ; plates normal ; coronelliform.. *Osceola* B. & G.

ιι. Calyces numerous, not fringed.

Attenuate ; dipsadiform ; isodont.. *Bucephalus* Smith.

Posterior teeth longer ; coronelliform ; anal divided ; one scale-pit..................... *Coronella* Laur.

Teeth subequal ; coronelliform ; anal divided ; two scale-pits ; pupil round.......... *Proterodon* Hallow.

Colubriform ; anal divided ; internasal and nasal united............................... *Symphimus* Cope.

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* Type *Zamenis ventrimaculatus* Gray.

† Type *Cyclophis major* Gthr.

‡ Zaocys Cope is apparently allied to this genus, but I do not know the penial structure.

§ Includes *Herpetodryas fuscus*, where the anal is sometimes divided.

‖ This is Phrynonax Cope, Boulenger. Compsosoma has priority, and the penial structure is identical.

ιιι. Calyces few, apical.

Subisodont; coronelliform: two nasals; a loreal; anal entire........................*Ophibolus* B. & G.

Isodont; fusiform; one nasal; no loreal; anal entire................................*Stylosoma* Brown.

ζζ. Median and posterior teeth longer than the others.

Coronelliform; pupil erect; calyces not fringed........................ ....*Dianodon* D. & B.

εε. Rostral plate produced or recurved.

ζ. Rostral not free laterally; pupil round.

η. Subcaudals one-rowed.

Internasals distinct; calyces few..*Rhinochilus* B. & G.

ηη. Subcaudals two-rowed.

θ. Internasals fused with nasals.

Fusiform; isodont; rostral depressed; calyces fringed ....*Chilomeniscus* Cope.

θθ. Internasals not fused with nasals.

Rostral trihedral; internasals present; anal entire; calyces not fringed ....*Cemophora* Cope.

Rostral recurved; no internasals; calyces numerous, fringed; anal divided.... ....*Ficimia* Gray.

Rostral not recurved; nasals distinct from labials; calyces numerous; anal divided.....* *Geagras* Cope.

Rostral not recurved; nasals distinct from labials; calyces very few......................*Conopsis* Gthr.

ζζ. Rostral plate free laterally; pupil erect.

Colubriform; subisodont...*Phyllorhynchus* Stejn.

γγ. Hemipenis capitate.

Pupil round; rostral free laterally...*Salvadora* B. & G.

Pupil erect; rostral normal...*Hypsiglena* Cope.

ββ. Calyces basin-like, large and shallow.

Isodont; colubriform; anal divided..† *Cacocalyx* Cope.

αα. An awn-like apical papilla.

Colubriform; scuta normal..*Cynophis* Gray.

** Calyx borders represented by tufts, which are divided into numerous papillæ.

Teeth longer posteriorly; scuta normal; colubriform ....‡ *Tylanthera* Cope.

*** Calyces split up into separate papillæ.

A preocular and one prefrontal plate...*Trimetopon* Cope.

No preocular and two prefrontals...*Adelphicus* Jan.

II. Anterior hypapophyses piercing the walls of the œsophagus.

α. Spines in transverse or flounced rows.

Calyces numerous, fringed; scuta normal; one nasal; dipsadiform ....*Dasypeltis* Wagl.

ANOPLOPHALLINÆ.

Sulcus undivided; surface with transverse papillose flounces; colubriform; anterior teeth longer.
§ *Anoplophallus* Cope.

LYCODONTINÆ.

This group is intermediate in penial character between several others. It is allied to the Calamarinæ through Grayia, and to the Dromicinæ through Homalosoma. Pseudaspis shows resemblance in the hemipenis to the Natricinæ, and Anomalodon is

* *G. frontalis* Cope examined.

† Type *Drymobius percarinatus* Cope, Costa Rica.

‡ Type *Zamenis florulentus* Geoffr., Western Asia.

§ Possibly this is Nymphophidium Gthr.

similar to Homalopsis. I find that the flouncing of the penial structure is not sufficient to define the group as I at first thought.

I. Sulcus spermaticus undivided.

a. Teeth continuous, longer posteriorly.

Hemipenis spinous to apex, flounces indistinct; pupil round, nostril in prenasal; fusiform. **Elapops* Gthr.

aa. Teeth interrupted; longer in front.

Hemipenis flounced at apex; pupil erect; colubriform .... *Lycodon* Boie.

II. Sulcus spermaticus double.

a. Teeth longer anteriorly. (Hemipenis bifurcate.)

Hemipenis spinous to apex, not flounced; nostril in prenasal........................ †*Lycophidium* Fitz.

Hemipenis spinous, flounced; anterior teeth separated from posterior by a space....... *Boaodon* D. & B.

Hemipenis spinous, flounced; maxillary teeth in a continuous series.................. *Lamprophis* Fitz.

aa. Teeth not longer anteriorly. Hemipenis not flounced.

Hemipenis not bifurcate.. *Homalosoma* Wagl.

Hemipenis bifurcate... *Pseudaspis* Cope.

aaa. Teeth much longer posteriorly. (Hemipenis bifurcate.)

Colubriform; rostral normal; spines very sparse.................................. ‡*Dromicodryas* Boul.

Coronelliform; rostral trihedral, prominent; spines very numerous.................. *Anomalodon* Jan.

The above genera are all Ethiopian, except Lycodon, which is Oriental.

NATRICINÆ.

We have here a well-defined and homogeneous group, which is distributed in the Northern Continents and the Oriental region. A species is said to be found in the Ethiopian, but I have not yet been able to examine its penial characters. I have ascertained that the genus Ablabes (type *A. baliodirus* by exclusion) belongs to this subfamily, and is characterized by an entirely unique penial structure, which places it in a section by itself.

I. Enlarged basal spines in symmetrical fasciculi. Sulcus undivided.

Two fasciculi on each side of the sulcus, the proximal pair nearly surrounding the base; both containing spines which are closely packed and issue from their fleshy margins; hemipenis undivided; scuta normal. .... *Ablabes* D. & B.

II. Enlarged spines isolated and more or less unsymmetrical.

A. Sulcus undivided.

a. Two large apical papillæ.

Scuta normal; anal entire.. *Tropidoclonium* Cope.

aa. No apical papillæ.

β. No preocular plate.

One internasal; anal divided; scales keeled.. *Haldea* B. & G.

Two internasals; scales keeled; anal divided....................................... *Amphardis* Cope.

Two internasals; scales smooth; anal divided....................................... *Virginia* B. & G.

ββ. Preocular present.

No loreal; anal divided; two internasals... *Storeria* B. & G.

* Vertebræ not seen. † *L. laterale* Hallow. examined. ‡ Lianthera Cope, *Amer. Naturalist,* 1893, p. 482.

A loreal ; anal entire ; two internasals .... *Eutænia* B. & G.
A loreal ; anal divided ; one internasal .... *Liodytes* Cope.
A loreal ; anal divided ; two internasals .... * *Natrix* Laur.

AA. Sulcus bifurcate. (Hemipenis furcate.)

Two apical papillæ ; plates as Natrix .... *Ceratophallus* Cope.
No papillæ ; plates as Natrix .... † *Bothrodytes* Cope.
No papillæ ; one prefrontal plate .... ‡ *Trimerodytes* Cope.

GLYPHODONTA.

This superfamily presents no such diversity of character as to indicate that it embraces more than one family, the **Dipsadidæ**. The subfamilies of the Dipsadidæ correspond quite closely with those of the Colubridæ. They are defined as follows:

I. Hypapophyses of vertebræ anterior only; hemipenis spinous.

Calyculate ; sulcus undivided .... *Dipsadinæ.*
Calyculate ; sulcus bifurcate .... *Scytalinæ.*
Not calyculate ; an apical disc .... *Erythrolamprinæ.*

II. Hypapophyses extending throughout column.

Not calyculate ; no basal hook nor apical disc .... *Homalopsinæ.*

These subfamilies correspond with those of the Colubridæ as follows:

COLUBRIDÆ.	DIPSADIDÆ.
Xenodontinæ,	Erythrolamprinæ,
Dromicinæ,	Scytalinæ,
Colubrinæ,	Dipsadinæ.
Lycodontinæ.	Homalopsinæ.

The distribution of the subfamilies of corresponding pairs is nearly identical. Thus the first two of both columns are South American, and the third of both columns is nearly cosmopolitan. The fourth group of each column is restricted to the African and Oriental regions. Still closer correspondences will be pointed out in the characters of some of the genera of corresponding subfamilies.

ERYTHROLAMPRINÆ.

In this subfamily the sulcus and hemipenis are bifurcate in the known genera.

I. Hemipenis generally spinous ; disc at the extremity of the sulcus.

Coronelliform ; scuta normal ; disc smooth .... *Erythrolamprus* Boie.

II. Hemipenis with spines in two bands only ; disc at one side of the sulcus.

Attenuate ; scuta normal ; disc papillose ; spines joined by a longitudinal membrane... § *Lygophis* Tsch.

SCYTALINÆ.

I. Hemipenis transversely or obliquely plicate (divided). (Flabellati.)

No calyces ; rostral plate normal .... *Jaltris* Cope.
Calyces at apex ; rostral plate produced .... *Conophis* Peters.

* Including Amphiesma D. & B. † Including Diplophallus Cope. ‡ *Proceeds. Acad. Phila.*, 1894, p. 426.
§ Cope, definition, *Amer. Naturalist*, 1894, p. 84.

II. Calyculate and not capitate. (Calyculati.)

φ. Hemipenis divided.

Rostral recurved........ *Rhinostoma* Wagl.
Rostral normal; pupil erect........ *Oxyrrhopus* Wagl.
Rostral normal; pupil round........ *Philodryas* Wagl.

φφ. Hemipenis undivided.

Rostral normal........ *Thamnodynastes* Wagl.

III. Capitate (also calyculate). (Capitati.)

Hemipenis undivided; colubriform........ *Coniophanes* Hallow.
Hemipenis undivided; fusiform........ *Hydrocalamus* Cope.

IV. Spinous to apex (divided). (Spinosi.)

Two nasal plates........ *Tachymenis* Wiegm.
One nasal plate........ *Tomodon* D. & B.

V. Bands of spines extending to apex. (Calycispinosi.)

Spines of bands minute; caudal scuta one-rowed........ *Scytale* Wagl.

The groups into which this subfamily is divided correspond closely with those which are found in the subfamily Dromicinæ. The group VI, including only the genus Heterodon, is the only one of the latter which is not represented in the former. Apart from penial characters, the genera of the corresponding groups sometimes resemble each other, but frequently they do not. Thus Alsophis resembles Philodryas, and Rhadinæa resembles Coniophanes, and Acanthophallus resembles Tomodon in general characters.

DIPSADINÆ.

I. Apex flounced. (Flabellati.)

a. Fusiform.

Internasals distinct; flounces spinous; subcaudals one-rowed........ *Uriëchis* Pet.
Internasals distinct; flounces spinous; subcaudals two-rowed........ *Urobelus* Rhdt.
Internasals and nasals fused; flounces not spinous; subcaudals two-rowed........ *Stenorhina* D. & B.

aa. Attenuate.

Calyces large, irregular; gastrosteges angulate........ *Chrysopelea* Boie.

II. Calyculate, not capitate. (Calyculati.)

a. Dipsadiform (head short, very distinct from neck).

β. No spines on hemipenis.

Calyces numerous........ * *Dipsadomorphus* Gthr.

ββ Spines present.

Calyces numerous........ *Dipsas* Laur.
Calyces very few........ *Crotaphopeltis* Fitz.

aa. Attenuate.

β. No diverticulum.

Pupil horizontal........ *Cladophis* Dum.
Pupil round........ *Oxybelis* Wagl.

ββ. Hemipenis with a diverticulum.

Pupil round........ *Dryophis*.

* Liophallus Cope, *Proceeds. Acad. Phila.*, 1894, p. 427.

aaa. Fusiform.

β. A loreal plate.

Tail abbreviated, rough........................*Procinura* Cope.
Tail normal; one nasal........................* *Elapomorphus* Wieg.
Tail normal; two nasals........................*Scolecophis* Cope.

ββ. No loreal.

Two pairs of genials........................*Tantilla* B. & G.
One pair of genials........................*Pogonaspis* Cope.

III. Calyculate and capitate. (Capitati.)

Calyces numerous; colubriform; anal double........................*Sibon* Fitz.

IV. Spinous to apex. (Spinosi.)

Fusiform; rostral prominent; anal divided........................*Ogmius* Cope.

V. Apex with longitudinal plicæ; calyces few and irregular.

Spines few; head very distinct; anal scutum double........................*Trimorphodon* Cope.

The groups of Dipsadinæ from I to IV inclusive correspond in penial characters to the groups similarly numbered in the Dromicinæ and Scytalinæ respectively. Group *aa* of Division I resemble in the same characters the Lycodontinæ, with which I at first associated them.

HOMALOPSINÆ.

I. Flounced; sulcus bifurcate.

Hemipenis bifurcate; spines numerous, small; one internasal; nasal plates not in contact behind rostral. *Cantoria* Gird.

Hemipenis as in Cantoria, except that there are large spines below bifurcation; nasal plates in contact behind rostral........................† *Hypsirhina* Wagl.

II. Not flounced; sulcus bifurcate (hemipenis bifurcate).

a. No tentacles on muzzle.

Spines numerous; one internasal plate; parietals undivided........................*Homalopsis* Kuhl.
Spines numerous; two internasal plates; parietals subdivided........................*Cerberus* Cuv.

aa. Tentacles on muzzle.

Spines numerous; one internasal; parietals undivided; tentacles lateral; robust..........*Herpeton* Lac.
Spines feeble, minute; parietals undivided; tentacle median; attenuate................*Langaha* Brug.

PROTEROGLYPHA.

I have been able to examine a limited number of species of this superfamily, and must therefore present an imperfect synopsis of the genera. I have examined enough of the species to affirm that they present variations of type similar to those seen among the superfamilies already considered. All the forms that I have seen have a bifurcate sulcus and all are spinous.

There are three families, as follows:

A postfrontal bone; fang grooved........................*Najidæ.*
No postfrontal bone; fang grooved........................*Elapidæ.*
A postfrontal; fang not grooved in front........................*Dendraspididæ.*

* Phalotris and Apostolepis probably belong here.

† *H. bocourtii* Vaill. examined.

Najidæ.

I. Apex of hemipenis smooth, with ruched free margin. (Disciferi.)

No solid maxillary teeth ; subcaudals one-rowed ; hemipenis bifurcate.............. *Acanthophis* Daud.

II. Apex with calyces. (Calyculati.)

a. Spinous below calyces.

Subcaudals one-rowed ; vertebral row enlarged ; hemipenis not divided................ *Bungarus* Daud.

Subcaudals two-rowed ; vertebral row not enlarged ; poison gland far posterior to head ; hemipenis not divided ; no solid teeth.. *Adeniophis* Meyer.

Hemipenis divided ; calyces not fringed ; no flounces ; subcaudals two-rowed ; no solid teeth. *Sepedon* Merr.

Hemipenis divided, the branches extensively flounced below calyces ; solid teeth..... *Ophiophagus* Gthr.

aa. Not spinous below calyces.

Hemipenis bifurcate ; calyces fringed ; anterior ribs elongate, erectile .... *Naja* Laur.

Hemipenis bifurcate ; anterior ribs not elongate or erectile ; solid teeth.................**Diemenia* Gray.

III. Apex papillose.

Hemipenis simple ; urosteges one-rowed ; rostral normal ; solid teeth............... *Hoplocephalus* Cuv.

Dendraspididæ.

The single genus of this family is characterized as follows :

Sulcus bifurcate ; hemipenis simple ; calyculate, becoming spinous at middle ; no teeth behind fang ; attenuate..†*Dendraspis* Schl.

Elapidæ.

The only genera of this family which I have examined are Elaps and Vermicella. The hemipenis is alike in both, *i. e.*, it is bifurcate, with each half with a spinous apex. The extension of the spines downwards differs with the species. Thus they extend but a short way in *Elaps corallinus*, but extend far down in *E. surinamensis* and *E. imperator* (see Pls. XXXI, XXXII).

PLATYCERCA.

But one family, the **Hydrophidæ,** is included in this division. I have been able to examine but two genera, Hydrus and Hydrophis. Specimens of Platurus at my disposal are all females.

Hemipenis undivided ; spinous to near apex, where it is papillose..................... *Hydrophis* Daud.

Hemipenis undivided, spinous to apex.. *Hydrus* Shaw.

SOLENOGLYPHA.

The families of the Solenoglypha are the following:

Maxillary bone not excavated ; fang not grooved in front ; no postfrontal bone..... *Atractaspididæ* Gthr.

Maxillary bone not excavated ; fang grooved in front ; a postfrontal..................... *Causidæ* Cope.

Maxillary bone not excavated ; fang not grooved ; a postfrontal .... *Viperidæ* Gray.

Maxillary bone excavated by a large chamber ; fang not grooved in front ; a postfrontal. *Crotalidæ* Gray.

* Only species examined, *D. annulata*, (*Naja*) Buch. and Peters, West Africa. † *D. jamesonii* Traill.

The penial characters of the Solenoglypha are like those of the more specialized members of the Colubroidea, and vary in the same way, except that the sulcus and the organ are always bifurcate.

Atractaspididæ.

The genera of this family are the following:

I. No internasal plates.

Urosteges one-rowed; anal entire .... *Brachycranium* Hallow.

II. Internasals present.

Urosteges one-rowed; anal entire .... *Atractaspis* Smith.

Urosteges more or less two-rowed; anal divided .... * *Clothelaps* Cope.

The only genus in which the hemipenis is known is Brachycranium. Here the sulcus and entire organ are furcate, and spinous to near the extremity. The latter is furnished with wrinkled laminæ, which enclose a few irregular calyces at the apex, and below these are transverse farthest from the sulcus and longitudinal nearest to it. The spines are in longitudinal series. The only species examined (*B. corpulentum* Hallow.) is not deeply bifurcate, and the bifurcation of the sulcus corresponds with that of the organ (Pl. XXXII, Fig. 6).

Causidæ.

Subcaudals two-rowed; anal entire; scales keeled; rostral prominent, with recurved border. *Heterophis* Pet.

Subcaudal and anal plates double; scales keeled; rostral normal .... *Causus* Wagl.

Subcaudals and anal entire; scales smooth; rostral normal; a loreal .... *Dinodipsas* Pet.

Subcaudals two-rowed; anal entire; scales smooth; rostral normal; a loreal, and one nasal plate. *Azemiophis* Boul.

The only genus which I have been able to examine as to the penial structure is Causus. The sulcus and organ are deeply and equally bifurcate and the branches are extensively calyculate, while the median portions are spinous. The calyculate region is traversed by a deep groove, which is bound on one side by a longitudinal ala. The calyces are replaced in the groove by depressed laminæ, while the opposite side of the ala supports the usual structure. The borders of the calyces are serrate in the *C. rhombeatus* (Pl. XXXII, Fig. 7).

The characters are in general like those of the typical Solenoglypha.

Viperidæ.

I. Urosteges two-rowed.

a. Apex of hemipenis calyculate.

No flounces; calyces deeply fringed; nostril between two plates .... *Vipera* Laur.

"Nostril between three plates" (Gthr.) .... *Daboia* Gray.

* Type *Atractaspis hildebrandtii* Peters; second species, *A. congica* Peters.

No flounces; calyces moderately fringed; nostril surrounded by scales and a supranasal; no supraocular nor nasal horns.......... *Bitis* Gray.

Flounced; spines below flounces; apex with calyces not fringed; nostril surrounded by scales and a supranasal, some of which are produced into horns.......... *Clotho* Gray.

aa. Apex of hemipenis spinous.

Nostril surrounded by scales and a nasal; horn-like supraocular scales.......... *Cerastes* Wagl.

II. Urosteges one-rowed.

Body and tail cylindric.......... *Echis* Merr.

Body and tail compressed and prehensile.......... *Atheris* Cope.

I am unacquainted with the penial structure of the last two genera.

Crotalidæ.

Two subfamilies are readily distinguishable, viz.:

No jointed caudal appendage.......... *Cophiinæ.*

A jointed caudal appendage.......... *Crotalinæ.*

COPHIINÆ.

β. Urosteges two-rowed.

Top of head scaled; urosteges four-rowed at end; a caudal spine.......... *Lachesis* Wagl.

Top of head with small scales; tail normal.......... * *Cophias* Merr.

Top of head with large imbricate shield-like scales.......... *Peltopelor* Gthr.

Top of muzzle scaled; rest of head shielded.......... *Hypnale* Cope.

Top of head with nine shields; scales carinate.......... *Trigonocephalus* Oppel.

Top of head with nine shields; scales smooth.......... *Calloselasma* Cope.

ββ. Urosteges one-rowed.

Body and tail cylindric, not prehensile; head scaly.......... *Bothriopsis* Pet.

Body and tail compressed, prehensile; head scaly, scales normal.......... *Bothriëchis* Pet.

As Bothriëchis, but a horn-like produced scale over eye.......... *Ophryacus* Cope.

Body and tail compressed, prehensile; head scaly; a row of scales outside the superciliary shield. *Teleuraspis* Cope.

Body and tail not prehensile; nine normal head-shields.......... *Ancistrodon* Beauv.

The genera of the above series which I have examined are Cophias, Trigonocephalus, Ophryacus, Bothriopsis, Teleuraspis and Ancistrodon. In all, the hemipenis is calyculate, excepting in Ancistrodon; here it is flounced above the spinous region, with a tendency to form calyces next to the sulcus in *A. piscivorus.* In *Trigonocephalus* (*Halys*) *himalayanus* the calyces are not fringed and are restricted to the distal portion of each branch.

CROTALINÆ.

Only two genera of this subfamily are known.

Head with nine normal shields.......... *Crotalophorus* Gray.

Head scaled above.......... *Crotalus* Lin.

* Bothrops Wagl., Trimesurus Lacep. Peters.

In Crotalophorus the hemipenis is finely flounced, as in Ancistrodon, adding this point of resemblance to the possession of similar head-shields. In Crotalus the organ is strongly calyculate, the lower rows becoming flounces in *C. basiliscus* and *C. confluentus*, but not in *C. horridus*, *C. durissus* nor *C. molossus*. My statement that the spines are not ossified in the *C. durissus* was due to the fact that I examined a specimen not fully grown, although it was not a very small one. It is represented on Pl. XXXIII, Fig. 11.

EXPLANATION OF PLATES.

The figures, excepting Fig. 9 of Pl. XXIV, represent the hemipenis of a side split open so as to show the structures that are exhibited by the entire circumference. Each figure is therefore twice as wide as the organ in its normal condition. Where the organ is bifurcate, one branch only is split, the other being represented as invaginated, and with a portion of the retractor muscle continuous with its apex. The letters on the plates have the following significance:

Ss, sulcus spermaticus; *cl,* calyculi or ruches; *f,* flounces; *sp,* spines; *spl,* spinules; *bh,* basal hook; *p,* papillæ; *l,* laminæ.

Plate XIV.

HEMIPENES OF DIFFERENT TYPES.

Fig. 1. *Ilysia scytale* L., Brazil. × 3.
Fig. 2. *Epicrates angulifer* D. & B., Cuba. × $\frac{3}{2}$.
Fig. 3. *Charina bottæ* Blv., Oregon. × 3.
Fig. 4. *Holarchus ancorus* Gird., Philippine Ids. × 2.
Fig. 5. *Oligodon subquadratus* D. & B., Java. × 3.
Fig. 6. *Bascanium constrictor* L., N. America. × 2.
Fig. 7. *Opheomorphus alticolus* Cope, Peru. × 3.
Fig. 8. *Natrix fasciata sipedon* L., N. America. × 3.
Fig. 9. *Naja haje* L. *melanoleuca* Hall., W. Africa. × 2.
Fig. 10. *Bitis arietans* L., S. Africa. × 2.
Fig. 11. *Crotalus confluentus* Say, Texas. × 2.

Plate XV.

PEROPODA, ACROCHORDIDÆ, CALAMARINÆ.

Fig. 1. *Boa constrictor* L., Brazil. × $\frac{3}{2}$.
Fig. 2. *Eunectes murinus* L., Brazil. × $\frac{3}{2}$.
Fig. 3. *Chilobothrus striatus* Fisch., Hayti. × 2.
Fig. 4. *Enygrus bibronii* D. & B., Fejee Ids. × 2.
Fig. 5. *Lichanura trivirgata* Cope, Low. California. × 2.
Fig. 6. *Eryx jaculus* L., W. Asia. × 3.
Fig. 7. *Python spilotes* Lacep., Australia. × 3.
Fig. 8. *Ungualia melanura* D. & B., Cuba. × 4.
Fig. 9. *Calamaria gervaisii* D. & B., Philippine Ids. × 6.

Fig. 10. *Holarchus dolleyanus* Cope, Hainan. × 4.
Fig. 11. *Dicraulax purpurascens* Schl., Malaysia. × 4.
Fig. 12. *Parcas moellendorffii* Boetch., Hainan. × 3. Both branches split.
Fig. 13. *Acrochordus granulatus* Merr., Siam. × 3.

Plate XVI.

COLUBRINÆ.

Fig. 1. *Drymobius bifossatus* Raddi, Brazil. × 2.
Fig. 2. *Coluber flavescens* Laur., Italy. × 2.
Fig. 3. *Pityophis sayi* Schl., W. N. America. × 2.
Fig. 4. *Zamenis ravergieri* Menetr., Persia. × 2.
Fig. 5. *Zamenis korros* L., Siam. × 2.
Fig. 6. *Cynophis helenæ* Daud., Ceylon. × 3.
Fig. 7. *Spilotes sebastus* Cope, Surinam. × 2.

Plate XVII.

COLUBRINÆ.

Fig. 1. *Compsosoma corais* Cuv., Brazil. × 3.
Fig. 2. *Compsosoma virgatum* Schl., Asia. × 2.
Fig. 3. *Compsosoma pœcilostoma* Wied., Brazil. × $\frac{3}{2}$.
Fig. 4. *Gonyosoma oxycephalum* Reims, India. × 2.
Fig. 5. *Herpetodryas carinatus* Linn., Brazil. × 2.
Fig. 6. *Crossanthera melanotropis* Cope, Costa Rica. × 2.
Fig. 7. *Cyclophis modestus* Mart., W. Asia. × 4.
Fig, 8. *Contia mitis* B. & G., California. × 4.

Plate XVIII.

COLUBRINÆ.

Fig. 1. *Bascanium flagelliforme* Laur., Florida. × 3.
Fig. 2. *Drymobius reticulatus* Peters, Peru. × 3.
Fig. 3. *Drymobius boddærtii* Seetz., Mexico. × 3.
Fig. 4. *Drymobius pulcherrimus* Cope, Nicaragua. × 4.
Fig. 5. *Zamenis hippocrepis* Linn., Italy. × 2.
Fig. 6. *Entechinus major* Gthr., China. × 4.
Fig. 7. *Salvadora bairdii* Jan., Mexico. × 4.
Fig. 8. *Macroprotodon cucullatus* D. & B , Algiers. × 4.
Fig. 9. *Geagras frontalis* Cope, Yucatan. × 3.
Fig. 10. *Ficimia olivacea* Gray, Mexico. × 4.
Fig. 11. *Chilomeniscus ephippicus* Cope, California. × 4.
Fig. 12. *Stylosoma extenuatum* Brown, Florida. × 3.
Fig. 13. *Hypsiglena ochrorhynchus* Cope, Texas. × 4.

Plate XIX.

COLUBRINÆ.

Fig. 1. *Drymobius margaritiferus* Schl., Mexico. × 3.
Fig. 2. *Cacocalyx percarinatus* Cope, Costa Rica. × 3.

Fig. 3. *Cyclophis aestivus* L., N. America. × 4.
Fig. 4. *Phyllorhynchus brownii* Stejn., Arizona. × 4.
Fig. 5. *Leptophis ahætulla* L., Brazil. × 3.
Fig. 6. *Leptophis præstans* Cope, Central America. × 3.
Fig. 7. *Thrasops flavigularis* Hallow., W. Africa. × 3.
Fig. 8. *Dendrophis picta* L., India. × 3.
Fig. 9. *Bucephalus capensis* Thunb., S. Africa. × 3.
Fig. 10. *Dasypeltis palmarum* Leach, W. Africa. × 4.
Fig. 11. *Cemophora coccinea* Blum., Florida. × 4.

Plate XX.

COLUBRINÆ.

Fig. 1. *Trimetopon pliolepis* Cope, Costa Rica. × 4.
Fig. 2. *Conopsis nasus* Gthr., Mexico. × 4.
Fig. 3. *Osceola elapsoidea* Holbr., Florida. × 4.
Fig. 4. *Osceola doliata triangulum* Boie, New York. × 4
Fig. 5. *Ophibolus rhombomaculatus* Holbr., D. Cal. × 2.
Fig. 6. *Ophibolus calligaster* Say, Kansas. × 3.
Fig. 7. *Ophibolus getulus* Linn., N. America. × 2.
Fig. 8. *Coronella girundica* Daud., Italy. × 3.
Fig. 9. *Proterodon tessellatus* Hallow., Japan. × 3.
Fig. 10. *Dianodon rufozonatus*, Cantor, China. × 3.
Fig. 11. *Symphimus leucostomus* Cope, Mexico. × 3.
Fig. 12. *Rhinochilus lecontei* B. & G., Texas. × 3.

Plate XXI.

COLUBRINÆ, NATRICINÆ.

Fig. 1. *Herpetodryas melas* Cope, Costa Rica. × 2.
Fig. 2. *Drymobius rhombifer* Gthr., Ecuador. × 4.
Fig. 3. *Coluber emoryi* B. & G., Texas. × 4.
Fig. 4. *Liopeltis vernalis* Harl., United States. × 4.
Fig. 5. *Acanthocalyx ventrimaculatus* Gray, W. Asia. × 4.
Fig. 6. *Tylanthera florulenta* Geoffr., W. Asia. × 4.
Fig. 7. *Contia episcopa* Kenn., Texas. × 4.
Fig. 8. *Ophibolus californiæ* DeBlv., Lower California. × 2.
Fig. 9. *Adelphicus quadrivirgatus* Jan., Centr. America. × 3.
Fig. 10. *Ablabes baliodirus* Boie, Malaysia. × 4.
Fig. 11. *Eutænia multimaculata* Cope, Chihuahua. × 4.

Plate XXII.

NATRICINÆ.

Owing to the position of the basal section the basal hook was in some cases lost.

Fig. 1. *Natrix rhombifera* Hallow., Texas. × 3.
Fig. 2. *Natrix vulgaris* Laur., Italy. × 4.
Fig. 3. *Eutænia sirtalis* L., N. America. × 4.
Fig. 4. *Eutænia melanogaster* Wiegm., Mexico. × 4.
Fig. 5. *Natrix kirtlandii* Kenn., N. America. × 4.
Fig. 6. *Bothrodytes ceylonensis* Gthr., Ceylon. × 4.

Fig. 7. *Bothrodytes tigrinus* Boie, Japan. × 4.
Fig. 8. *Bothrodytes piscator* Schneid., India. × 4.
Fig. 9. *Bothrodytes spilogaster* Boie, Java. × 4.
Fig. 10. *Storeria dekayi* Storer, N. America. × 4.
Fig. 11. *Storeria occipitomaculata* Holbr., N. America. × 4.
Fig. 12. *Tropidoclonium lineatum* Hallow., Texas. × 4.

Plate XXIII.

NATRICINÆ AND HOMALOPSINÆ.

Fig. 1. *Eutænia proxima* Say, Texas. × 4.
Fig. 2. *Natrix septemvittata* Say, Pennsylvania. × 4.
Fig. 3. *Natrix grahamii* B. & G., Texas. × 4.
Fig. 4. *Natrix hydrus* Pallas, S. Europe. × 4.
Fig. 5. *Natrix viperina* Merr., Italy. × 4.
Fig. 6. *Natrix stolata* L., Hainan, China. × 4.
Fig. 7. *Natrix storerioides* Cope, Mexico. × 4.
Fig. 8. *Liodytes allenii* Garman, Florida. × 4.
Fig. 9. *Virginia valeriæ* B. & G., Texas. × 4.
Fig. 10. *Haldea striatula* L., Texas. × 4.
Fig. 11. *Ceratophallus vittatus* L., Java. × 3.
Fig. 12. *Herpeton tentaculatum* Lacep., Siam. × 4.
Fig. 13. *Homalopsis buccata* L., Siam. × 3.
Fig. 14. *Cerberus rhynchops* Schn., India. × 3.
Fig. 15. *Cantoria elapiformis* Peters, Siam. × 3.

Plate XXIV

LYCODONTINÆ.

Fig. 1. *Lycodon aulicus* L., India. × 4.
Fig. 2. *Anoplophallus maculatus* Hallow. × 3.
Fig. 3. *Boaodon virgatus* Hallow., West Africa. × 3.
Fig. 4. *Boaodon infernalis* Gthr., S. Africa. × 3.
Fig. 5. *Lamprophis inornatus* D. & B., S. Africa. × 3.
Fig. 6. *Lycophidium laterale* Hallow., W. Africa. × 3.
Fig. 7. *Elapops modestus* Gthr., W. Africa. × 4.
Fig. 8. *Dromicodryas bernierii* D. & B., Madagascar. × 4.
Fig. 9. *Pseudaspis cana* L., South Africa; the hemipenis in natural erection and not split, one-half not fully evaginated; from the outside; *a* from above. × 2.
Fig. 10. *Homalosoma lutrix* L., S. Africa. × 4.
Fig. 11. *Anomalodon madagascariensis* D. & B., Madagascar. × 3.

Plate XXV.

DROMICINÆ.

Fig. 1. *Hypsirhynchus ferox* Gthr., Hayti. × 3.
Fig. 2. *Dromicus parvifrons* Cope, Hayti. × 4.
Fig. 3. *Ocyophis ater* Gosse, Jamaica. × 2.
Fig. 4. *Alsophis angulifer* D. & B., Cuba. × 2.
Fig. 5. *Farancia abacura* Holbr., Louisiana. × 2.

Fig. 6. *Carphophiops amoena* Say, N. America. × 4.
Fig. 7. *Echinanthera cyanopleura* Cope, S. Brazil. × 4.
Fig. 8. *Rhadinæa decorata* Gthr., Mexico. × 4.
Fig. 9. *Pliocercus elapoides* Cope, Mexico. × 4.
Fig. 10. *Ninia atrata* Hallow., Mexico. × 4.
Fig. 11. *Tretanorhinus variabilis* D. & B., Cuba. × 3.
Fig. 12. *Abastor erythrogrammus* Daud., Georgia, N. Amer. × 2.

LEPTOGNATHINÆ.

Fig. 13. *Petalognathus nebulata* L., Costa Rica. × 4.

Plate XXVI.

XENODONTINÆ.

Fig. 1. *Aporophis anomalus* Günth., Paraguay. × 3.
Fig. 2. *Xenodon almadensis* Wagl., Brazil. × 3.
Fig. 3. *Opheomorphus typhlus* L., Brazil. × 3.
Fig. 4. " *cobella* L., Brazil. × 4.
Fig. 5. *Xenodon severus* L., Brazil. × 4.
Fig. 6. *Lystrophis orbignyi* D. & B., S. Brazil. × 3.

DROMICINÆ.

Fig. 7. *Pseudoeryx plicatilis* Linn., Brazil. × 2.
Fig. 8. *Helicops fumigatus* Cope, Brazil. × 3.
Fig. 9. *Rhabdosoma badium* Boie, Upper Amazon. × 4.
Fig. 10. " *elaps* Gthr., Upper Amazon. × 3.
Fig. 11. *Acanthophallus colubrinus* Günth., Brazil. × 4.
Fig. 12. *Uromacer oxyrhynchus* D. & B., Hayti. × 3.
Fig. 13. *Amastridium veliferum* Cope, Panama. × 4.
Fig. 14. *Diadophis regalis* B. & G., Arizona. × 4.

Plate XXVII.

XENODONTINÆ.

Fig. 1. *Xenodon reginæ* L. var. Venezuela. × 3.
Fig. 2. *Opheomorphus brachyurus* Cope, Brazil. × 4.

DROMICINÆ.

Fig. 3. *Hydrops martii* Spix., Brazil. × 4.
Fig. 4. *Taeniophallus nicagus* Cope, Brazil. × 4.
Fig. 5. *Monobothris chamissonis* Wiegm., Peru. × 3.
Fig. 6. *Rhadinæa flavilatus* Cope, Florida. × 3.

SCYTALINÆ.

Fig. 7. *Hydrocalamus quinquevittatus* D. & B., Mexico. × 3.
Fig. 8. *Philodryas viridissimus* L., Brazil. × 4.
Fig. 9. *Thamnodynastes strigatus* Gthr., S. Brazil. × 3.
Fig. 10. *Thamnodynastes nattererii* Mik., S. Brazil. × 4.
Fig. 11. *Tachymenis peruvianus* Wiegm., Peru. × 3.
Fig. 12. *Tomodon ocellatus* D. & B., Uruguay. × 4.
Fig. 13. *Rhinostoma nasuum* Wagl., S. Amer. × 3.

Fig. 14. *Scytale coronatum* Schneid., S. Amer. × 4.
Fig. 15. *Langaha nasuta* Shaw, Madagascar. × 3.
Fig. 16. *Grayia smythii* Leach, W. Africa. × 2.

Plate XXVIII.

ERYTHROLAMPRINÆ AND SCYTALINÆ.

Fig. 1. *Erythrolamprus venustissimus* Boie, Brazil. × 3.
Fig. 2. *Conophis lineatus* D. & B., Mexico. × 3.
Fig. 3. *Jaltris dorsalis* Gthr., Hayti. × 2.
Fig. 4. *Oxyrrhopus plumbeus* Wied., Brazil. × 3.
Fig. 5. *Oxyrrhopus petalarius* L., Brazil. × 3.
Fig. 6. *Philodryas nattererii* Steind., Paraguay. × 2.
Fig. 7. *Philodryas schottii* Fitz., Paraguay. × 2.
Fig. 8. *Coniophanes fissidens* Gthr., Centr. America. × 4.

Plate XXIX.

DROMICINÆ, LEPTOGNATHINÆ, ERYTHROLAMPRINÆ AND DIPSADINÆ.

Fig. 1. *Heterodon nasicus* B. & G., Dakota. × 3.
Fig. 2. *Heterodon platyrhinus* Latr., N. America. × 2.
Fig. 3. *Mesopeltis sanniolus* Cope, Yucatan. × 4.
Fig. 4. *Leptognathus anthracops* Cope, Nicaragua. × 4.
Fig. 5. *Tantilla rubra* Cope, Mexico. × 4.
Fig. 6. *Elapomorphus michoacanensis* Dug., Mexico. × 4.
Fig. 7. *Uriechis microlepidotus* Gthr., Natal. × 3.
Fig. 8. *Stenorhina ventralis* D. & B., Mexico. × 3.
Fig. 9. *Dipsadomorphus trigonatus* Schn., Malacca. × 3.
Fig. 10. *Psammodynastes pulverulentus* Boie, Tonquin. × 4.
Fig. 11. *Dryophis fulgidus* Daud., Centr. America. × 3.
Fig. 12. *Lygophis elegans* Tsch., Peru. × 2. Letter *p*, apical disc ; p^1, same in profile, enlarged.

Plate XXX.

DIPSADINÆ.

Fig. 1. *Dipsadomorphus fuscus* Gray, Australia. × 3.
Fig. 2. *Dipsas dendrophila* Reinwt., Java. × 2.
Fig. 3. *Himantodes gemmistratus* Cope, W. Mexico. × 4.
Fig. 4. *Rhinobothryum lentiginosum* Scop., Brazil. × 3.
Fig. 5. *Sibon septentrionale* Kenn., Mexico. × 4.
Fig. 6. *Sibon nigrofasciatum* Gthr., Nicaragua. × 4.
Fig. 7. *Trimorphodon biscutatus* D. & B., Mexico. × 2.
Fig. 8. *Crotaphopeltis rufescens* Gm., Africa. × 2.
Fig. 9. *Chrysopelea ornata* Shaw, India. × 2.
Fig. 10. *Procinura æmula* Cope, Mexico. × 3.
Fig. 11. *Scolecophis atrocinctus* D. & B., Centr. America. × 4.
Fig. 12. *Tantilla melanocephala* Schl., Brazil. × 4.
Fig. 13. *Pogonaspis ruficeps* Cope, Costa Rica. × 4.
Fig. 14. *Cladophis kirtlandii* Hallow., W. Africa. × 4.
Fig. 15. *Tragops laetus* Cope, Farther India. × 4.
Fig. 16. *Oxybelis acuminata* Wied., Centr. America. × 4.

Plate XXXI.

PROTEROGLYPHA AND PLATYCERCA.

Fig. 1. *Dendraspis jamesonii* Traill (*Dinophis hammondii* Hallow.), W Africa. × 3.
Fig. 2. *Acanthophis antarctica* Shaw, Australia. × 3.
Fig. 3. *Sepedon hæmachates* Merr., S. Africa. × 3
Fig. 4. *Bungarus semifasciatus* Kuhl, India. × 3.
Fig. 5. *Adeniophis bivirgatus* Schl., Siam. × 4.
Fig. 6. *Hoplocephalus coronatus* Schl., Australia. × 4.
Fig. 7. *Elaps corallinus* L., Central America. × 3.
Fig. 8. *Elaps surinamensis* Cuv., Brazil. × 3.
Fig. 9. *Vermicella annulata* Gray, Australia. × 4.
Fig. 10. *Hydrophis hardwickii* Gray, Siam. × 3.

Plate XXXII.

PROTEROGLYPHA, PLATYCERCA, SOLENOGLYPHA.

Fig. 1. *Diemenia annulata* Buch. & Pet., W. Africa. × 2.
Fig. 2. *Ophiophagus bungarus* Schl., Malacca. × 1.
Fig. 3. *Elaps imperator* Cope, Ecuador. × 4.
Fig. 4. *Hydrophis stokesii* Gray, Singapore. × $\frac{3}{2}$.
Fig. 5. *Hydrus bicolor* Shaw, Pacific Ocean. × 3.
Fig. 6. *Brachycranium corpulentum* Hallow., W. Africa. × 4.
Fig. 7. *Causus rhombeatus* Licht., Centr. Africa. × 3.
Fig. 8. *Cophias atrox* L., Nicaragua. × 3.
Fig. 9. *Bothriopsis affinis* Boc., Mexico. × 4.
Fig. 10. *Crotalus molossus* B. & G., Arizona. × 4.

Plate XXXIII.

SOLENOGLYPHA.

Fig. 1. *Clotho rhinocerus* Schl., Gaboon. × $\frac{3}{2}$.
Fig. 2. *Vipera aspis* L., Italy. × 3.
Fig. 3. *Cerastes ægyptiacus* L. × 2.
Fig. 4. *Ancistrodon contortrix* L., New York. × 3.
Fig. 5. *Ancistrodon piscivorus* L., Florida. × 2.
Fig. 6. *Cophias alternatus* D. & B., Brazil. × 2.
Fig. 7. *Ophryacus undulatus* Jan., Mexico. × 2.
Fig. 8. *Crotalophorus catenatus* Raf., Michigan. × 3.
Fig. 9. *Crotalus horridus* L., Pennsylvania. × 2.
Fig. 10. *Crotalus basiliscus* Cope, Mexico. × 2.
Fig. 11. *Crotalus durissus* L., Brazil; young. × 3.

NOTE.—The *Anoplophallus maculatus* Hallow., of the preceding pages is the *Ophites subcinctus* of Boie. There are no hypapophyses on the posterior dorsal vertebræ; hence the species must be arranged with Lycodon, from which it differs in penial characters.

ARTICLE IV.

OLD BABYLONIAN INSCRIPTIONS CHIEFLY FROM NIPPUR.

PART II.

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Read before the American Philosophical Society, January 17, 1896.

PREFACE.

The publication of the history of the American Expedition to Nuffar, announced in the Preface to the first part of the present work, has been delayed by unforeseen circumstances. In view of the increased interest[1] in these excavations, it seems now necessary to summarize the principal results[2] and submit them to a wider circle of students.

The expedition left America in the summer, 1888, and has continued to the present day, with but short intervals required for the welfare and temporary rest of the members in the field and for replenishing the exhausted stores of the camp. The results obtained have been extraordinary, and, in the opinion of the undersigned editor, have fully repaid the great amount of time and unselfish devotion, the constant sacrifice of health and comfort, and the large pecuniary outlay, which up to date has reached the sum of $70,000. Three periods can be distinguished in the history of the excavations.

[1] Cf. especially the official report on the results of the excavations sent by Hon. A. W. Terrell, the United States Minister in Constantinople, to his government in Washington, summer, 1894.

[2] For details cf. the "Bibliography of the Expedition," in Part I, p. 45. To the list there given may be added Peters, "Some Recent Results of the University of Pennsylvania Excavations at Nippur," in *The American Journal of Archæology* X, pp. 13–46, 352–368 (with copious extracts from Mr. Haynes' weekly reports to the Committee in Philadelphia); Hilprecht, "Aus Briefen an C. Bezold," in *Zeitschrift für Assyriologie* VIII, pp. 386–391; *Assyriaca*, Sections I, III–VI. A brief sketch of the history and chief results of the "American Excavations in Nuffar" will be found in Hilprecht, *Recent Research in Bible Lands*, pp. 45–63.

First Campaign, 1888–1889.—Staff: John P. Peters, Director; H. V. Hilprecht and R. F. Harper, Assyriologists; J. H. Haynes, Business Manager, Commissary and Photographer; P. H. Field, Architect; D. Noorian, Interpreter; Bedry Bey, Commissioner of the Ottoman Government.[1] Excavations from February 6 to April 15, 1889, with a maximum force of 200 Arabs. *Principal results:* Trigonometrical survey of the ruins and their surroundings, examination of the whole field by trial trenches, systematic excavations chiefly at III, V, I and X.[2] Many clay coffins examined and photographed. Objects carried away: Over 2000 cuneiform tablets and fragments (among them three dated in the reign of King Ashuretililâni of Assyria), a number of inscribed bricks, terra-cotta brick stamp of Narâm-Sin, fragment of a barrel cylinder of Sargon of Assyria, inscribed stone tablet (Pl. 6), several fragments of inscribed vases (among them two of King Lugalzaggisi of Erech), door-socket of Kurigalzu; c. 25 Hebrew bowls; a large number of stone and terra-cotta vases of various sizes and shapes; terra-cotta images of gods and their ancient moulds; reliefs, figurines and toys in terra-cotta; weapons and utensils in stone and metal; jewelry in gold, silver, copper, bronze and various precious stones; a number of weights, seals and seal cylinders, etc.

Second Campaign, 1889–1890.—Staff: J. P. Peters, Director; J. H. Haynes, Business Manager, Commissary and Photographer; D. Noorian, Interpreter and Superintendent of Workmen; and an Ottoman Commissioner. Excavations from January 14 to May 3, 1890, with a maximum force of 400 Arabs. *Principal results:* Examination of ruins by trial trenches and systematic excavations at III, V and X continued. Row of rooms on the S. E. side of the ziggurrat and shrine of Bur-Sin II excavated. Objects carried away: About 8000 cuneiform tablets and fragments (most of them dated in the reigns of Cassite kings and of rulers of the second dynasty of Ur); a number of new inscribed bricks; 3 brick stamps in terra-cotta and three door-sockets in diorite of Sargon I; 1 brick stamp of Narâm-Sin; 61 inscribed vase fragments of Alusharshid; 2 vase fragments of Entemena of Shirpurla; 1 inscribed unhewn marble block and several vase fragments of Lugalkigubnidudu; a few vase fragments of Lugalzaggisi; 2 door-sockets in diorite of Bur-Sin II; over 100 inscribed votive axes, knobs, intaglios, etc., presented to the temple by Cassite kings; c. 75 Hebrew and other inscribed bowls; 1 enameled clay coffin and many other antiquities similar in character to those excavated during the first campaign but in greater number.

[1] D. G. Prince, of New York, was the eighth member of the expedition, but during the march across the Syrian desert he fell so seriously sick that he had to be left behind at Bagdad, whence he returned to America.

[2] These numbers refer to the corresponding sections of the ruins, as indicated on the plan published in Part I, Pl. XV.

Third Campaign, 1893–1896.—Staff: J. H. Haynes, Director, etc.; and an Ottoman Commissioner; Joseph A. Meyer, Architect and Draughtsman, from June to November, 1894. Excavations from April 11, 1893, to February 15, 1896 (with an interruption of two months, April 4 to June 4, 1894), with an average force of 50–60 Arabs. *Principal results:* Systematic excavations at III, I, II, VI–X, and searching for the original bed and banks of the Shaṭṭ-en-Nîl. Examination of the lowest strata of the temple, three sections excavated down to the water level; critical determination of the different layers on the basis of uncovered pavements and platforms; the later additions to the ziggurrat studied, photographed and, whenever necessary, removed; the preserved portions of Ur-Gur's ziggurrat uncovered on all four sides; systematic study of the ancient system of Babylonian drainage; the two most ancient arches of Babylonia discovered; structures built by Narâm-Sin and pre-Sargonic buildings and vases unearthed; c. 400 tombs of various periods and forms excavated and their contents saved. Objects carried away: About 21,000 cuneiform tablets and fragments (among them contracts dated in the reign of Dungi and of Darius II and Artaxerxes Mnemon); many bricks of Sargon I and Narâm-Sin; the first inscribed brick of Dungi in Nippur; 15 brick stamps of Sargon I, 1 of Narâm-Sin; inscribed torso of a statue in diorite ($\frac{2}{3}$ of life size, c. 3000 B.C.) and fragments of other statues of the same period; incised votive tablet of Ur-Enlil; 3 unfinished marble blocks of Lugal-kigub-nidudu and over 500 vase fragments of pre-Sargonic kings and patesis; c. 60 inscribed vase fragments of Alusharshid, 1 of Sargon, 3 of Entemena; 1 door-socket and 1 votive tablet of Ur-Gur; 1 votive tablet of Dungi; a number of inscribed lapis lazuli discs of Cassite kings; fragment of a barrel cylinder of the Assyrian period; fragments of an Old Babylonian terra-cotta fountain in high relief; water cocks, drain tiles, a collection of representative bricks from all the buildings found in Nippur; c. 50 clay coffins and burial urns, and many other antiquities of a character similar to those excavated during the first two campaigns but in greater number and variety.

With regard to the wealth of its results this Philadelphia expedition takes equal rank with the best sent out from England or France. The systematic and careful manner of laying bare the vast ruins of the temple of Bêl and other buildings in Nuffar, with a view to a complete and connected conception of the whole, is equal to that of Layard and Victor Place in Assyria and something without parallel in previous expeditions to Babylonia. Only an exhaustive study and a systematic publication of selected cuneiform texts, which will finally embrace twelve volumes of two to three parts each, can disclose the manifold character of these documents—syllabaries, letters, chronological lists, historical fragments, astronomical and religious texts, building inscriptions, votive tablets, inventories, tax lists, plans of estates, contracts, etc. The results so far obtained have already proved their great importance in connection with ancient chronology, and the fact that nearly all the periods of Babylonian history are represented by inscriptions from the same ruins will enable us, in these publications, to establish a sure foundation for palæographic research.

Each of the three expeditions which make up this gigantic scientific undertaking has contributed its own peculiar share to the total results obtained. The work of the first, while yielding many inscribed documents, was principally tentative and gave us a clear conception of the grandeur of the work to be done. The second continued in the line of research mapped out by the first, deepened the trenches and gathered a richer harvest in tablets and other inscribed monuments. But the crowning success was reserved for the unselfish devotion and untiring efforts of Haynes, the ideal Babylonian explorer. Before he accomplished his memorable task, even such men as were entitled to an independent opinion, and who themselves had exhibited unusual courage and energy, had regarded it as practically impossible to excavate continuously in the lower regions of Mesopotamia. On the very same ruins of Nippur, situated in the neighborhood of extensive malarial marshes and "amongst the most wild and ignorant Arabs that can be found in this part of Asia,"[1] where Layard himself nearly sacrificed his life in excavating several weeks without success,[2] Haynes has spent almost three years continuously, isolated from all civilized men and most of the time without the comfort of a single companion. It was, indeed, no easy task for any European or American to dwell thirty-four months near these insect-breeding and pestiferous Affej swamps, where the temperature in perfect shade rises to the enormous height of 120° Fahrenheit (= c. 39° Réaumur), where the stifling sand-storms from the desert rob the tent of its shadow and parch the human skin with the heat of a furnace, while the ever-present insects bite and sting and buzz through day and night, while cholera is lurking at the threshold of the camp and treacherous Arabs are planning robbery and murder—and yet during all these wearisome hours to fulfill the duties of three ordinary men. Truly a splendid victory, achieved at innumerable sacrifices and under a burden of labors enough for a giant, in the full significance of the word, a *monumentum aere perennius.*

But I cannot refer to the work and success of the Babylonian Exploration Fund in Philadelphia without saying in sorrow a word of him who laid down his life in the cause of this expedition. Mr. Joseph A. Meyer, a graduate student of the Department of Architecture in the Massachusetts Institute of Technology, in Boston,

[1] Layard, *Nineveh and Babylon*, p. 565.

[2] Layard, *l. c.*, pp. 556–562. "On the whole, I am much inclined to question whether extensive excavations carried on at Niffer would produce any very important or interesting results" (p. 562).

had traveled through India, Turkey and other Eastern countries to study the history of architecture to the best advantage. In May, 1894, he met Mr. Haynes in Bagdad and was soon full of enthusiasm and ready to accompany him to the ruins of Nuffar. By his excellent drawings of trenches, buildings and objects he has rendered most valuable service to this expedition. But in December of the same year his weakened frame fell a victim to the autumnal fevers on the border of the marshes, where even before this the Syrian physician of the second campaign and the present writer had absorbed the germs of malignant typhus. In the European cemetery of Bagdad, on the banks of the Tigris, he rests, having fallen a staunch fighter in the cause of science. Even if the sand-storms of the Babylonian plains should efface his solitary grave, what matters it? His bones rest in classic soil, where the cradle of the race once stood, and the history of Assyriology will not omit his name from its pages.

The Old Babylonian cuneiform texts submitted in the following pages have again been copied and prepared by my own hand, in accordance with the principle set forth in the Preface to Part I. The favorable reception which was accorded to the latter by all specialists of Europe and America has convinced me that the method adopted is the correct one. I take this opportunity to express my great regret that this second part of the first volume could not appear at the early date expected. The fact that two consecutive summers and falls were spent in Constantinople, completing the reorganization of the Babylonian Section of the Imperial Museum entrusted to me; that during the same period three more volumes were in the course of preparation, of which one is in print now;[1] that a large portion of the time left by my duties as professor and curator was to be devoted to the interest of the work in the field; that the first two inscriptions published on Pls. 36–42 required more than ordinary time and labor for their restoration from c. 125 exceedingly small fragments; and that, finally, for nearly four months I was deprived of the use of my overtaxed eyes, will, I trust, in some degree explain the reasons for this unavoidable delay. In connection with this statement I regard it my pleasant duty to express my sincere gratitude to George Friebis, M.D., my valued confrère in the American Philosophical Society, for his unceasing interest in the preparation of this volume, manifested by the great amount of time and care he devoted to the restoration of my eyesight.

The publication of this second part, like that of the first, was made possible by the liberality and support of the American Philosophical Society, in whose TRANSACTIONS it appears. To this venerable body as a whole, and to the members of its Publication Committee, and to Secretary Dr. George H. Horn, who facilitated the print-

[1] Vol. IX, *Tablets Dated in the Reigns of Darius II and Artaxerxes Mnemon*, prepared in connection with my pupil, Rev. Dr. A. T. Clay, now instructor of Old Testament Theology in Chicago.

ing of this work in the most cordial manner, I return my heartiest thanks and my warm appreciation.

No endeavor has been made to arrange Nos. 86–117 chronologically. Although on palæographic evidence certain periods will be readily recognized in these texts, the cuneiform material of the oldest phase of Babylonian history is still too scanty to allow of a safe and definite discrimination. In order to present the monumental texts from Nippur as completely as possible, the fragment of a large boundary stone now in Berlin has found a place in these pages. For permitting its reproduction and for providing me with an excellent cast of the original, Prof. A. Erman, Director of the Royal Museums, has my warmest thanks. I acknowledge likewise my obligations to Dr. Talcott Williams of Philadelphia and to Rev. Dr. W. Hayes Ward of New York for placing the fragment of a barrel cylinder of Marduk-shâbik-zêrim and the impression of a Babylonian seal cylinder respectively at my disposal. If the text of the latter had been published before, Prof. Sayce would not have drawn his otherwise very natural inference (*The Academy*, Sept. 7, 1895, p. 189) that the Hyksos god Sutekh belongs to the language and people of the Cassites.[1] I do not need to offer an apology for including the large fragment of Narâm-Sin's inscription (No. 120), the only cuneiform tablet found in Palestine (No. 147) and the first document of the time of Marduk-aḫê-irba,[2] a member of the Pashe dynasty, in the present series. In view of the great importance which attaches to these monuments, a critical and trustworthy edition of their inscriptions had become a real necessity.

The little legend, No. 131, the translation of which is given in the "Table of Contents," will prove of exceptional value to metrologists. At the same time I call the attention of Assyriologists to the interesting text published on Pl. 63, which was restored from six fragments found among the contents of as many different boxes of tablets.

Nos. 124 and 126, which were copied during the time of the great earthquakes in Constantinople, 1894, belong to the collection designated by me as Coll. Rifat Bey. Together with several hundred other tablets they were presented to the Imperial Ottoman Museum by Rifat Bey, military physician of a garrison stationed in the neigh-

[1] Prof. Sayce's view rests on Mr. Pinches's hasty transliteration made in connection with a brief visit to America in 1893 and published in Dr. Ward's *Seal Cylinders and Other Oriental Seals* (Handbook No. 12 of the Metropolitan Museum of Art in New York), No. 391, where the Cassite god *Shugab* (= Nergal, cf. Delitzsch, *Kossäer*, p. 25, l. 12) was transliterated incorrectly by *Shu-taḫ*. I called Dr. Ward's attention to this apparent mistake and gave the correct reading in my *Assyriaca*, p. 93, note.

[2] A boundary stone. The inscription has suffered much from its long exposure to the rain and sun of Babylonia. The original, which the proprietor kindly permitted me to publish, is in Constantinople. The stone is so important that it should be purchased by an American or European museum. My complete transliteration and translation of this text and of Nos. 151 and 152 will appear in one of the next numbers of *Zeitschrift für Assyriologie*.

borhood of Tello, and were catalogued by the undersigned writer. His Excellency, Dr. Hamdy, Director General, and his accomplished brother, Dr. Halil, Director of the Archæological Museum on the Bosphorus, who in many ways have efficiently promoted the work of the American Expedition, and who by their energetic and intelligent efforts have placed the rapidly growing Ottoman Museum on a new, scientific basis, deserve my heartiest thanks for permitting the publication of these texts, and for many other courtesies and personal services rendered during my repeated visits to the East.

For determining the mineralogical character of the several stones, I am greatly indebted to my colleagues, Profs. Drs. E. Smith and A. P. Brown, of the University of Pennsylvania.

The systematic excavations of the last decenniums have revolutionized the study of ancient history and philology, and they have opened to us long-forgotten centuries and millenniums of an eventful past. Hieroglyphics and cuneiform inscriptions were deciphered by human ingenuity, and finally the brilliant reasoning and stupendous assiduity of Jensen in Marburg have forced the "Hittite" sphinx to surrender her long-guarded secret. He who has taken the pains to read and read again and analyze the results of Jensen's extraordinary work critically and *sine ira et studio*, must necessarily arrive at the conclusion as to the general correctness of his system. I am neither a prophet nor the son of a prophet, but I see the day not very far, when the world will wonder—just as we wonder now when we glance back upon the sterile years following Grotefend's great achievement—that at the close of the nineteenth century years could elapse before Jensen's discovery and well-founded structure created any deep interest and received that general attention which it deserves. The beautiful marble slab recently found near Malatia[1] has offered a welcome opportunity to test the validity of his theory. But the great *desideratum* seems to be more material than is at present at our disposal. Excavations in the mounds of Malatia would doubtless yield it. But what European government, what private citizens, will furnish the necessary funds? May the noble example given by a few liberal gentlemen of Philadelphia find a loud echo in other parts of the world, and may the work which they themselves have begun and carried on successfully and systematically for several years in Nippur, never lack that hearty support and enthusiasm which characterized its past history. The high-towering temple of Bêl is worthy of all the time and labor

[1] May 23, 1894, together with two other smaller fragments, and now safely deposited in the Imperial Ottoman Museum. With Hamdy Bey's permission published in Hilprecht, *Recent Research in Bible Lands*, p. 160. Cf. also Hogarth in *Recueil*, XVII, p. 25 f. The inscription cannot be older than 750–700 B.C. The artist took as his motive a hunting scene from the royal palaces of Nineveh. A critical analysis of the well-preserved text will be given by Jensen in the next number of *Recueil*.

and money spent in its excavation. Though now in ruins, the vast walls of this most ancient sanctuary of Shumer and Akkad still testify to the lofty aspirations of a bygone race, and even in their dreary desolation they seem to reëcho the ancient hymn once chanted in their shadow:

Shadû rabû ^{ilu}*Bêl Imḫarsag*	O great mountain of Bêl, Imkharsag,
sha rêshâshu shamâmi shannâ	whose summit rivals the heavens,
apsû ellim shurshudû ushshûshu	whose foundations are laid in the bright abysmal sea,
ina mâtâti kîma rîmi ekdu rabṣu	resting in the lands as a mighty steer,
ḳarnâshu kîma sharûr ^{ilu}*Shamash shittananbiṭû*	whose horns are gleaming like the radiant sun,
kîma kakkab shamê nabû malû ṣiḫâti.	as the stars of heaven are filled with lustre.
(IV *R.* 27, No. 2, 15–24.)	

H. V. HILPRECHT.

FEBRUARY 15, 1896.

INTRODUCTION.

I.

THE LOWEST STRATA OF EKUR.

The vast ruins of the temple of Bêl are situated on the E. side of the now empty bed of the Shaṭṭ-en-Nîl, which divided the ancient city of Nippur into two distinct parts.[1] At various times the space occupied by each of the two quarters differed in size considerably from the other. Only during the last centuries before the Christian era, when the temple for the last time had been restored and enlarged on a truly grand scale by a king whose name is still shrouded in mystery,[2] both sides had nearly the same extent. This became evident from an examination of the trial trenches cut in different parts of the present ruins and from a study of the literary documents and other antiquities obtained from their various strata. As long, however, as the temple of Bêl existed, the E. quarter of the city played the more important *rôle* in the history of Nippur.

Out of the midst of collapsed walls and buried houses, which originally encompassed the sanctuary of Bêl on all four sides and formed an integral part of the large temple enclosure, there rises a conical mound to the height of 29 m.[3] above the plain and 15 m. above the mass of the surrounding *débris*. It is called to-day *Bint-el-Amîr* ("daughter of the prince")[4] by the Arabs of the neighborhood and covers the ruins of the ancient *ziggurratu* or stage tower of Nippur, named *Imğarsag*[5] or *Sagash*[6] in the cuneiform

[1] Layard (*Nineveh and Babylon*, p. 551) and Loftus (*Travels and Researches*, p. 101) stated this fact clearly. Notwithstanding their accurate description, on most of our modern maps the site of the city is given inaccurately by being confined to the E. side of the canal.

[2] He cannot have lived earlier than c. 500 B.C., and probably later.

[3] Loftus's estimate of seventy feet (*l. c.*, p. 101) is too low.

[4] Layard, *l. c.*, p. 557. Cf. Loftus, *l. c.*, pp. 102f.

[5] "Mountain of heaven," pronounced later *Imursag*. Cf. Jensen in Schrader's *Keilinschriftliche Bibliothek* III, Part 1, p. 22, note 5, and Hommel, *Sumerische Lesestücke*, p. 26, No. 306.

[6] "High towering" (on the ending *sh* cf. Hommel, *l. c.*, p. 141, 2a). Cf. II *R.* 50, 5–6 a, b. A third name existed but is broken away on this tablet (4 a). For *Imğarsag* cf. also IV *R.* 27, No. 2, 15 and 17.

inscriptions (cf. Pls. XXIX and XXX). A number of Babylonian kings[1] applied themselves to the care of this temple by building new shrines, restoring old walls and repairing the numerous drains and pavements of the large complex, known under the name of *Ekur* ("mountain house").[2] But the three great monarchs who within the last three millenniums before Christ, above all others,[3] devoted their time and energy to a systematic restoration and enlargement of the ziggurrat and its surroundings, and who accordingly have left considerable traces of their activity in Nuffar,[4] are Ashurbânapal (668–626 B.C.),[5] Kadashman-Turgu (c. 1250 B.C.)[6] and Ur-Gur (c. 2800 B.C.).[7] The structures of each of these builders have been, one after the other, cleared, measured, photographed and examined in all their details by Mr. Haynes, the intrepid and successful director of the American expedition during the last four years. He is soon expected to communicate the complete results of his work, illustrated by numerous drawings and engravings, in Series B of the present publication. Therefore, referring all Assyriologists to this proposed exhaustive treatise on the history of the excavations, I confine myself to a brief examination of the lowest strata of ancient Ekur, which will enable us to gain a clearer conception of the earliest phase of Babylonian history. Whenever it seems essential, Haynes's own words will be quoted from his excellent weekly reports to the Committee in Philadelphia.

UR-GUR.

At the time of King Ur-Gur the ziggurrat of Nippur stood on the N.-W. edge of an immense platform, which formed the pavement of the entire temple enclosure. It was laid about 2.5 m. above the present level of the plain and had an average thickness of 2.40 m. In size,[8] color and texture the sun-dried and uninscribed bricks of

[1] Among them **Dungi** (Pl. 52, No. 123, cf. his brick legend in Part III of the present work), **Ur-Ninib** (Pl. 18, No. 10, and Pl. XXIII, No. 65), **Bur-Sin I** (Pl. 11, No. 19), **Ishme-Dagân** (Pl. 9, No. 17, cf. his brick legend in Part III), **Bur-Sin II** (Pls. 12f., Nos. 20–22), **Kurigalzu** (Pl. 20, No. 38), **Ramm^n-shumuṣur** (Pl. 28, No. 81), **Esarhaddon** (cf. Vol. X of the present work and Hilprecht in *Z. A.*, VIII, pp. 390f.). As to the earliest builders cf. below.

[2] Cf. Pl. 1, No. 1, 8; Pl. 2, No. 2, 10; Pl. 20, No. 38, 7; Pl. 28, No. 81, 8; Pl. 29, No. 82, 8; Pl. 51, No. 121, 8; also Jensen, *Kosmologie*, pp. 185ff.

[3] With the exception of the unknown builder above referred to, who enlarged the base of the early ziggurrat considerably and changed its form entirely by adding a peculiar cruciform structure (each arm being 16.48 m. long by 6.16 m. wide) to the centre of its four sides. Each side appeared to have a gigantic wing.

[4] Cf. Part I, p. 5, note, and Nöldeke in Hilprecht, *Assyriaca*, p. 86, note 1.

[5] Cf. Pl. 29, No. 82, and Hilprecht in *Z. A.*, VIII, pp. 389ff.

[6] Cf. Pl. 24, No. 8, 8. His brick legend will be published in Part III.

[7] Cf. I *R.* 1, No. 8f., and Pls. 51f. of the present work.

[8] 23 × 15 4 × 7.7 cm., practically the same size as Ur-Gur's bricks found in the *Buwariyya* of Warka. Cf. Loftus, *l. c.*, p. 168.

this pavement are identical with the mass of crude bricks forming the body of the ziggurrat, while in size and general appearance they closely resemble the burned bricks which bear the name of Ur-Gur. The natural inference would be that Ur-Gur himself erected this large terrace to serve as a solid foundation for his lofty temple. Yet so long as the inside of the massive ruins has not been thoroughly explored, there remains a slight possibility that the body of the ziggurrat and the pavement existed before Ur-Gur, and that this king only repaired and restored an older building, using in the manufacture of his bricks the mould of his predecessor. On the basis of the present almost convincing evidence, however, I favor the former view and, with Haynes, doubt very much whether before Ur-Gur's time a ziggurrat existed in ancient Nippur.[1]

The base of Ur-Gur's ziggurrat formed a right-angled parallelogram nearly 59 m. long and 39 m. wide.[2] Its two longest sides faced N.-W. and S.-E. respectively,[3] and the four corners pointed approximately to the four cardinal points.[4] Three of the stages have been traced and exposed (cf. Pl. XXX). It is scarcely possible that formerly other stages existed above.[5] The lowest story was c. $6\frac{1}{3}$ m. high, while the second (receding a little over 4 m. from the edge of the former) and the third are so

[1] The ancient name of the temple, *Ekur*, in use even at Sargon's time, proves nothing against this theory. On the basis of Taylor's, Loftus's and his own excavations, Haynes inclines to the view that Ur-Gur was the first builder of ziggurrats in Babylonia. As these two English excavators however did not examine the strata below Ur-Gur's terraces, it will be wiser to suspend our judgment for the present, although the absence of a ziggurrat in Tello favors Haynes's view.

[2] In size practically identical with Ur-Gur's structure in Muqayyar (ratio of 3 : 2). Cf. Loftus, *l. c.*, p. 129.

[3] The longest sides of the ziggurrat in Ur faced N. E. and S. W. respectively. Cf. Loftus, *l. c.*, p. 128.

[4] "The N. corner is 12° E. of N." (Peters in *The American Journal of Archæology*, X, p. 18). The Babylonian orientation was influenced by the course of the Euphrates and Tigris, as the Egyptian by the trend of the Nile valley (Hagen in *Beiträge zur Assyriologie* II, p. 246, note). The Assyrian word for "North," *ish(l)tânu*, means "No. I." From this fact, in connection with the observation that in the Babylonian contract literature, etc., in most cases the **upper** smaller side (or front) of a field faces N., it follows that the Babylonians looked towards N. in determining the four cardinal points, and accordingly could not very well designate "West" by a word which means originally "back side" (Delitzsch, *Assyrisches Handwörterbuch*, p. 44f., and Schrader in *Sitzungsberichte der Königl. Preussisch. Akademie der Wissenschaften*, 1894, p. 1301) like the Hebrews, who faced E. Besides, it is grammatically scarcely correct to derive אוריה, a Babylonian loan-word in the Talmud, from a supposed Babylonian *aḫa(u)rru* instead of *avurru* [for this very reason I read the bird mentioned in II *R*. 37, 12 e. f., not *a*-**ḫar**-*shu-nu* (Delitzsch, *l. c.*, p. 45) but *a*-**mur**-*shu-nu*=אורשנא (cf. Halévy in *Revue Sémitique* III, p. 91)]. Consequently the only possible reading is *am(v)urru*, "West," as proposed by Delattre, in view of $^{\text{mâtu}}$*A-mu ri* and $^{\text{âlu}}$*A-mu-ur-ra* in the Tell-el-Amarna tablets (cf. also a Babylonian (sic!) village or town *A-mu-ur-ri-i*$^{\text{ki}}$ in Meissner, *Beiträge zum Altbabylonischen Privatrecht*, No. 42, 1 and 21). Independently a similar result was reached by Hommel in *Zeitschrift der Deutschen Morgenländischen Gesellschaft* XLIX, p. 524, note 3.

[5] No trace of a fourth story could be discovered, and the accumulation of *débris* on the top of Bint-el-Amîr is not large enough to warrant the assumption of more than three stages. In Ur Loftus discovered but two distinct stages (*l. c.*, p. 128).

utterly ruined that the original dimensions can no more be given.[1] The whole ziggurrat appears like an immense altar, in shape and construction resembling a smaller one discovered in a building to the S.-W. of the temple.

As stated above, the body (and faces) of the ziggurrat consist of small, crude bricks,[2] with the exception of the S.-E. side of the lowest stage, which had an external facing of burned bricks of the same size.[3] To preserve such a structure for any length of time it was necessary to provide it with ample and substantial drainage. Thanks to the untiring efforts of Haynes, who for the first time examined the ancient Babylonian system of canalisation critically, we learn that the ziggurrat of Nippur had water conduits of baked brick[4] in the centre of each of the three unprotected sides. They were found in the lower stage and possibly existed also in the upper[5] ruined portions. On all four sides around the base of the walls was a plaster of bitumen,[6] 2.75 cm. wide and gradually sloping outward from the ziggurrat towards a gutter, which carried the water away (cf. Pl. XXIX, No. 74).[7] By this very simple arrangement the falling rain was conducted to a safe distance and the unbaked brick foundations were thoroughly protected.

Unlike the ziggurrat of Sin in Ur, which had its entrance on the N.-E. side,[8] the ascent to the different stages in Nippur was at the S.-E. Two walls of burned bricks,[9] 3.40 m. high, 16.32 m. long and 7 m. distant from each other, ran nearly parallel,[10] at

[1] The surface of these stages "was covered with a very tenacious plaster of clay mixed with cut straw," in order to protect them against storm and rain. "In places this plaster is still perfect, while in other places several coatings are visible, plainly showing that from time to time the faces of the ziggurrat were replastered" (Haynes, Report of Sept. 1, 1894).

[2] Cf. above, p. 230, note 8, "Traces of decayed straw were discovered in these bricks" (Haynes, Report of Feb. 9, 1895).

[3] In Ur the exterior of the whole lower story was faced by Ur-Gur with baked bricks (Loftus, *l. c.*, pp. 129f.), while in Warka "unlike other Babylonian structures" the lower stage of the Buwariyya "is without any external acing of kiln-baked brickwork" (Loftus, *l. c.*, p. 167).

[4] Each c. 1 m. wide by 3.25 deep. To judge from the height of the "buttresses" in Warka, the true meaning of which Loftus failed to recognize, the lowest stage of the Buwariyya had the same height as that of the ziggurrat of Nippur. Cf. Loftus, *l. c.*, p. 169.

[5] Cf. Loftus, *l. c.*, p. 129.

[6] This plaster rested upon "a level pavement of two courses of bricks also laid in bitumen, and was 28 cm. thick where it flanked the walls, and 7.7 cm. at its outer edge" (Haynes, Report of Feb. 10, 1894).

[7] The projecting casing wall at the base (1.38 m. high) consists of sixteen courses of (stamped) bricks and was built by Kadashman-Turgu around the three unprotected sides of the ziggurrat. In the middle distance of the picture is seen a section of the latest crude brick superstructure (cf. above, p. 230 and note 3) with a tunnel tracing the face of the lowest stage of Ur-Gur's and Kadashman-Turgu's ziggurrat.

[8] Loftus, *l. c.*, p. 129.

[9] Many of which were stamped with Ur-Gur's well-known legend I *R.* 1, No. 9.

[10] Where they joined the wall of the ziggurrat the distance between them (7 m.) was 1.65 m. greater than at their outer end.

right angles from the face of the ziggurrat, into the large open court, which extended to the great fortification of the temple. This causeway[1] was filled up with crude bricks of the same size and mould and formed a kind of elevated platform, from which apparently steps, no longer in existence, led up to the top of the ziggurrat and down into the open court in front of it.

The whole temple enclosure was surrounded by a large inner and outer wall built of sun-dried bricks. To the N.-W. of Ekur "30 courses of these bricks are still plainly visible."[2] They compose the ridge of the outer wall and, like the pavement of Ur-Gur's ziggurrat, rest on an older foundation. The complete excavation of the inner wall will be undertaken in connection with the systematic examination and removal of the ruins around the ziggurrat.

SARGON AND NARÂM-SIN.

Immediately below "the crude brick platform of Ur-Gur," under the E. corner of the ziggurrat, was another pavement consisting of two courses of burned bricks of uniform size and mould.[3] Each brick measures c. 50 cm. in square and is 8 cm. thick. This enormous size is quite unique among the more than twenty-five different forms of bricks used in ancient Nippur, and enables us to determine the approximate date of other structures built of similar material in other parts of the city. Fortunately most bricks of this pavement are stamped. A number of them contain the well-known inscription of **Shargâni-shar-âli**, while the rest bears the briefer legend of **Narâm-Sin** (Part I, Pls. 3 and II). This fact is significant. As both kings used the same peculiar bricks, which were never employed again in the buildings of Nippur, and as they are found near together and intermingled in both courses of the same pavement, the two men must necessarily be closely associated with each other. This ancient brick pavement becomes therefore a new and important link in the chain of my arguments in favor of the identity of Shargâni-shar-âli[4] with Sargon I, father of

[1] Both the walls of the causeway and those of the ziggurrat were battered, the batter of the former (1 : 8) being exactly half the batter of the latter (1 : 4), according to Haynes's Report of Feb. 9, 1895. Cf. Loftus, *l. c.*, p. 128.

[2] Haynes, Report of Sept. 8, 1894.

[3] Niebuhr's very recent remarks on the historicity of Sargon I and Narâm-Sin (*Chronologie der Geschichte Israels, Ægyptens, Babyloniens und Assyriens*, Leipzig, 1896, p. 75) should never have been made after the publication of their inscriptions in the first part of the present work. His insinuations against the priests of Nippur read like a carnival joke, in the light of the facts presented in the following sketch.

[4] Oppert's proposed reading of this name as *Bingani sar-iris* (*Revue d'Assyriologie* III, pp. 25f.) is impossible and was declined in *Assyriaca*, p. 30, note 1. The original picture of the sign *Shar* in our name is not "l'hiéroglyphe de l'arbre en feuilles" (Oppert, *l. c.*), but an enclosed piece of land covered with plants, in other words a plantation, garden, orchard (*kirû*). Cf. Bertin, *Origin and Development of the Cuneiform Syllabary*, p. 7.

Narâm-Sin[1] (Part I, pp. 16–19). It was apparently laid by Sargon and relaid by his son, Narâm-Sin, who utilized part of his father's bricks, and it must therefore be recognized as the true level of the Sargon dynasty in the lower strata of the temple at Nuffar. No bricks of either of the two kings have been found below it, nor in fact any other inscribed objects that can be referred to them.[2] But another, even more powerful witness of Narâm-Sin's activity in Nippur[3] has arisen from some ruins in the neighborhood of Ekur.

On the plan of Nuffar published in Part I, Pl. XV, a ridge of low insignificant-looking mounds to the N.-W. of the temple[4] is marked VII. They represent a portion of *Nîmit-Marduk*, the outer wall of the city.[5] Its upper part, as stated above, was constructed by Ur-Gur. During the summer of 1895 Mr. Haynes excavated the lower part of this rampart. He selected a piece of 10 m. in length and soon afterwards reported the following surprising results. The foundation of the wall was placed on solid clay c. $\frac{2}{3}$ m. below the water level or c. 5 m. below the plain of the desert. It was "built of worked clay mixed with cut straw and laid up *en masse* with roughly sloping or battered sides" to a total height of c. 5.5 m. Upon the top of this large base, which is c. 13.75 m. wide, a wall of the same enormous width, made of sun-dried

[1] More recently (*Altorientalische Forschungen* III, p. 238) Winckler refers to Shargâni-shar-âli as the possible historical basis of "the mythical Sargon of Agade." I trust the day is not very far when he will regard Sargon as historical and identical with Shargâni-shar-âli, as I do.

[2] The brick stamp of Sargon, mentioned below, p. 243, as having been unearthed underneath the wall of Ur-Gur's archive, indicates that this underground archive or cellar existed at Sargon's time at that very spot and was rebuilt by Ur-Gur.

[3] Inscribed burned bricks of Narâm-Sin were also found in mound X, on the W. bank of the Shaṭṭ-en-Nîl at a very low level. All the stamped bricks of Narâm-Sin "show evident traces of red coloring on their under or inscribed face" (Haynes, Report of Nov. 24, 1894).

[4] Originally these mounds continued a little farther N. W. than they can be traced on the map, until suddenly they turned to the W., reaching the Shaṭṭ en-Nîl apparently not far from II. A large open space, "414 m. long by 276 m. wide and covering more than 26 acres of ground," was enclosed by this wall, by the mounds called VIII and by the temple complex (III). As far as the present evidence goes, this court was never occupied by any brick buildings. Its real purpose can therefore only be surmised. According to Haynes (Report of August 3, 1895) it served as a caravanserai for the accommodation and safety of pilgrims and their animals. Such a view is possible, but it seems to me more probable to regard this enclosed place as a court where the numerous cattle, sheep, etc., received by the temple administration as regular income and for special sacrifices, were kept and sheltered. Perhaps it served both purposes. Besides in the time of war the inhabitants of Nippur readily found a safe refuge behind its walls. On the N. E. side of this court, "at the foot of the enclosing wall, a bubbling spring was discovered. On either side of the spring are still seen the brick platforms and curbs where the water pots rested." From the size of the bricks, which "appear to be the half bricks of Narâm-Sin," the spring existed at the time of this great builder. "After the court had become filled to a depth of about 1 m., a diagonal wall of burned bricks, $5\frac{1}{2}$ m. long, six courses high, placed on a raised base of clay, was built before the spring to divert the course of drifting sand and *dêbris* from the court."

[5] Cf. II *R.* 50, 29 a, b. The inner fortification (*dûru*) was called *Imgur-Marduk* (*ibidem*, 28 a, b). Cf. Delitzsch, *Wo lag das Paradies?* p. 221. Both names seem to be of comparatively late date and cannot be applied to Narâm-Sin's fortifications. According to II *R.* 50, 30f, a, b, two other names existed for the outer wall (*shalḫû*).

bricks, was raised to an unknown height.[1] We may well ask in amazement, Who was the builder of this gigantic wall, constructed, as it seems, *ana ûm ṣâte?* Nobody else than the great Narâm-Sin, whom Niebuhr of Berlin finds hard to regard as a historical person! Perhaps this scholar will now release me from presenting "wirkliche Inschriften politischer und als solcher glaubhafter[2] Natur, damit man ihrer [namely, Sargon's and Narâm-Sin's] einstmaligen Existenz vollkommen traue."[3] The bricks had exactly the same abnormal size as the burned bricks of the pavement below the ziggurrat and, in addition, although unbaked, bore Narâm-Sin's usual stamped inscription of three lines. "They are dark gray in color, firm in texture and of regular form. In quality they are unsurpassed by the work of any later king, constituting by far the most solid and tenacious mass of unbaked brick that we have ever attempted to cut our way through."[4] A large number of "solid and hollow terra-cotta cones in great variety of form and color,"[5] and many fragments of water spouts were found in the *débris* at the bottom of the decaying wall. The former, as in Erech,[6] were used for decoration, the latter apparently for the drainage of the rampart.[7] Possibly there were buildings of some kind on the spacious and airy summit of the wall,[8] although nothing points definitely to their previous existence.

[1] I have summarized the details of Haynes's report, according to which the original base was c. 5 m. high and c. 10.75 m. wide. "Directly upon this foundation Narâm-Sin began to build his wall, 10.75 m. wide and six courses high. For some reason unknown to us, the builder changed his plan at this point and widened the wall by an addition of c. 3 m. in thickness to the inner face of the wall, making the entire thickness or width of the wall c. 13.75 m. This addition, like the original foundation, was built of worked clay mixed with cut straw, and from the clay bed was built up to the top of the moulded brick wall, making a new and wider base, c. 5.5 m. high by c. 13.75 m. wide. Upon this new and widened base a new wall of equal width was built by Narâm-Sin, whose stamped bricks attest his workmanship. In the construction of the original base, c. 5 m. high and c. 10.75 m. wide, there is nothing to furnish a clue to its authorship" (Report of August 3, 1895). In the same letter Haynes argues very plausibly, as follows: "Had the superstructure been built upon the original base, as it was begun, it would naturally appear that the entire structure from its foundation was the work of Narâm-Sin; yet because Narâm-Sin changed the proportions of the wall, it may with some show of reason be assumed that Narâm-Sin himself began to build upon the foundation of a predecessor, perhaps of his father Sargon, with the intention of completing the original design, and that his own ideas then began to fix upon a different or at least upon a larger plan requiring a wider base to build upon."

[2] I am afraid Niebuhr's use of "politisch" und "glaubhaft" as two corresponding terms is very "unhistorisch." Apparently he has a very curious conception of the significance of an inscribed Babylonian brick as a historical document over against the "political inscriptions" too often subjectively colored. Cf. Maspero, *The Dawn of Civilization*, p. 626, with whom I agree.

[3] Carl Niebuhr, *l. c.*, p. 75.

[4] Haynes, Report of Sept. 8, 1895.

[5] "Red and black color are abundant. The hollow cones are of larger size than the solid cones" (Report of July 27, 1895).

[6] Cf. Loftus, *l. c.*, p. 187ff.

[7] It is doubtful whether the cones and spouts belonged to Narâm-Sin's or Ur-Gur's structure; the water spouts point to the time of the former, however.

[8] Haynes inclines strongly to the view that there existed "a tier of rooms flush with the outer face of the wall, and a broad terrace before them overlooking the great enclosure" (Report of Aug. 3, 1895). This view is closely

The construction of so gigantic a fortification by Narâm-Sin proves the political importance of Nippur at an early time, and reveals, in its own peculiar way, the religious influence which Ekur exercised in the ancient history of the country. A number of scattered references in the oldest cuneiform inscriptions extant—as, *e. g.*, the fact that the supreme god of Lagash is called *gud Inlil* by several kings and governors of Tello,[1] that Edingiranagin[2] bears the title *mupadx Inlila-ge*, that Urukagina[3] as well as Entemena[4] built a shrine to *Inlil*, that the rulers of Kìsh,[5] Erech[6] and of other early Babylonian centres,[7] who lived about the period of the kings of Shirpurla, paid their respect to Bêl, repeatedly making valuable offerings and numerous endowments, and claimed as *patesi gal Inlila*[8] the right of chief officer in his sanctuary and domain—and the interesting passage in the bilingual text of the creation story,[9] where Nippur seems to be regarded as the oldest city of Babylonia, find a welcome confirmation in the results obtained by our systematic excavations.

A comparatively small portion of the enormous temple area has so far been thoroughly examined, although for more than five years the constant hard labor of fifty to four hundred Arabic workmen has been devoted to its exploration. The results have already been extraordinary; they will become more so when our work shall be completed. That no independent buildings of Sargon have as yet been discovered will be partly explained in the light of the statement just made. The large number of Sargon's brick stamps[10] excavated at different times chiefly within the temple enclosure,

connected with his theory as to the use of the court, above referred to. "In a hot country, infested with robbers and swarming with insects, the rooms on the wall and the terrace in front of them would have offered admirable sleeping quarters for the hosts of pilgrims at Bêl's most famous shrine (*ibidem*)."

[1] *E. g*, by **Urukagina** [De Sarzec, *Découvertes en Chaldée*, p. XXX, squeeze (cf. p. 109f.), col. I, 2; and Pl. 5, No. 1, 2f. (also Amiaud, on p. XXX)], **Enanatuma I** [inscription published by Heuzey in *Revue d'Assyriologie* III, p. 3', 2], **Entemena** [De Sarzec, *l. c.*, Pl. 31, No. 3, col. I, 2; and *Revue d'Assyriologie* II, p. 148, col. I, 2], **Enanatuma II** [De Sarzec, *l. c.*, Pl. 6, No. 4, 2].

[2] De Sarzec, *l. c.*, Pl. 31, No. 2, col. I, 5f. (cf. *Revue d'Assyriologie* II, p. 81).

[3] De Sarzec, *l. c.*, Pl. 5, No. 1, 35–38; Pl. 32, col. III, 1–3; squeeze (p. XXX), col. III, 7–9.

[4] De Sarzec in *Revue d'Assyriologie* II, p. 149, col. IV, 4–7 (to be supplemented by De Sarzec, *Découvertes*, passages quoted in the preceding note).

[5] Hilprecht, *Old Babylonian Inscriptions*, Part II, Pl. 43, No. 3. Cf. Pl. 46, No. 108.

[6] Hilprecht, *l. c.*, Pls. 38–42, No. 87.

[7] *E. g.*, Ur, cf. Hilprecht, *l. c.*, Pls. 36f., No. 86; Pl. 42, No. 88 and No. 89. Cf. also Pl. 42, No. 90; Pl. 43, Nos. 91f.

[8] Lugalzaggisi. Cf. Hilprecht, *l. c.*, Pl. 38, No. 87, col. I, 15f.

[9] Pinches in *Records of the Past*[2], Vol. VI, p. 109, 6.

[10] Not less than eighteen (either whole or fragmentary) terra-cotta stamps have been unearthed, seven of them within one fortnight in December, 1895. Most of them are without handles. Apparently several broke while in use at Sargon's time and were then thrown away. Others were doubtless broken intentionally in connection with the disastrous event mentioned below, p. 244.

his stamped bricks[1] found under the platform of Ur-Gur, and the regular title *bâni*[2] *Ekur bît Bêl in Nippur* occurring in all his inscriptions from Nuffar[3] indicate that important structures, similar to those of his son, must have existed in some part of these high and extended accumulations. The perplexing question is, at which particular spot have we to search for them? And shall we ever really find them? Just as the bricks of Ur-Gur lie directly upon the splendid structure of Narâm-Sin in the large enclosing wall (*Nimit-Marduk*), so "the great crude brick platform of Ur-Gur's ziggurrat practically rests upon Narâm-Sin's pavement."[4] This fact is of importance, for we draw the natural conclusion from it that all the buildings that once stood upon this latter pavement were razed by Ur-Gur, in order to obtain a level ground for his own extended brick pavement, which served as the new foundation for Ekur.

THE PRE-SARGONIC PERIOD.

The average accumulations of *débris* above the pavement of Narâm-Sin measure a little over 11 m. in height and cover about 4000 years of Babylonian history. Have any traces of an earlier temple beneath the pavement of the Sargon dynasty been found in Nuffar? Several sections on the S.-E. side of the ziggurrat have been excavated by Mr. Haynes down to the water level.[5] I am therefore fully prepared to make the following statement, which will sound almost like a fairy tale in the ears of Assyriologists and historians who have been accustomed to regard the kingdom of Sargon as legendary and the person of Narâm-Sin as the utmost limit of our knowledge of ancient Babylonian history. The accumulations of *débris* from ruined buildings, partly preserved drains, broken pottery and many other remnants of human civilization between Narâm-Sin's platform and the virgin soil below, are not less than 9.25 m. The age of these ruins and what they contain can only be conjectured at the present

[1] The fragment of the first Sargon brick excavated in Nuffar at the beginning of 1894 is published on Pl. XXI, No. 63. It proves that Sargon did not only stamp his legend upon the bricks but sometimes wrote it. For a stamped specimen cf. Part III.

[2] Written *ba-GIM* = *(ba-)bâni* or *(ba-)bân*, in other words expressed by an ideogram and preceding phonetic complement (the earliest example of this kind in Semitic cuneiform texts). Cf. Hilprecht, *Assyriaca*, p. 70, note (end). Examples for this peculiar use of a phonetic complement are extremely rare and will be found in *Assyriaca*, Part II.

[3] Pls. 1–3, Nos. 1–3.

[4] Haynes, Report of Aug. 3, 1895. In advance I warn all those who seem to know Babylonian chronology better (?!) than King Nabonidos of Babylon, not to use this fact against the king's 3200 years, and to keep in mind that also Ur-Gur, Kadashman-Turgu and Ashurbânapal follow each other immediately in their work at the ziggurrat.

[5] To illustrate the amount of time, patience and labor needed for the systematic exploration of these lowest strata, it may be mentioned that one of the sections excavated contained "more than 60,000 cubic feet" of earth, which had to be carried away in basketfuls a distance of 120 m. and at the same time to be raised to a height of 15–24 m. Haynes, Report of Oct. 5, 1895.

time. But as no evidence of an ancient ziggurrat previous to Ur-Gur and Narâm-Sin has been discovered, the accumulations must have necessarily been slower and presuppose a longer period than elapsed between Narâm-Sin and the final destruction of Ekur in the first post-Christian millennium. I do not hesitate, therefore, to date the founding of the temple of Bêl and the first settlements in Nippur somewhere between 6000 and 7000 B.C.,[1] possibly even earlier. I cannot do better than repeat Haynes' own words, written out of the depth of this most ancient sanctuary of the world so far known: "We must cease to apply the adjective earliest to the time of Sargon or to any age or epoch within 1000 years of his advanced civilization."[2] "The golden age of Babylonian history seems to include the reign of Sargon and of Ur-Gur."[3]

Somewhat below the pavement of Narâm-Sin, between the entrance to the ziggurrat and the E. corner, stood an altar of sun-dried brick, facing S.-E. and 4 m. long by 2.46 m. wide. The upper surface of this altar[4] was surrounded by a rim of bitumen (18 cm. high), and was covered with a layer of white ashes (6.5 cm. thick), doubtless the remnant of burned sacrifices. To the S.-W. of it Haynes discovered a kind of bin built of crude brick and likewise filled with (black and white) ashes to the depth of c. 30 cm.[5] At a distance of nearly 2 m. from the altar (in front of it) and c. 1.25 m. below the top was a low wall of bricks, whose limits have not yet been found. Apparently it marked a sacred enclosure around the altar, for it extended far under the pavement of Narâm-Sin[6] and reappeared under the W. corner of the ziggurrat.[7] The bricks of which this curb was built are plano-convex in form.[8] They are laid in mud seven courses (= 45 cm.) high,[9] the convex surface, which is "curiously creased lengthwise," being placed upward in the wall.

At a distance of 4.62 m. outside of this low enclosure and c. 36 cm. below its bottom stood a large open vase in terra-cotta with rope pattern[10] (cf. Pl. XXVII, No. 72). It will serve as an excellent specimen of early Babylonian pottery in the fifth millennium before Christ. Undisturbed by the hands of later builders, it had remained

[1] A similar conclusion was reached by Peters in *The American Journal of Archæology* X, pp. 45f.

[2] Report of August 30, 1895.

[3] Report of August 3, 1895.

[4] Which was 0.92 m. below the level of Narâm-Sin's pavement.

[5] Haynes, Report of Feb. 17, 1894 (also Aug. 24, 1895). Haynes's chemical analysis of the white ashes showed evident traces of bones.

[6] The facts concerning this curb have been gathered from Haynes's Reports of Feb. 17 and March 17, 1894; Aug. 3, 1895.

[7] Cf. Peters, *The American Journal of Archæology* X, pp. 31 and 44.

[8] With an average length and breadth of 24.5 × 18 cm.

[9] "Being placed lengthwise and crosswise in alternate courses" (Haynes, Report of March 17, 1894).

[10] Haynes, Report of Aug. 24, 1895.

in its original upright position for more than 6000 years, and it was buried under a mass of earth and *débris* long before Sargon I was born and Narâm-Sin fortified the temple of Nippur.[1]

A second vase of similar size but different pattern[2] was discovered 77 cm. below the former and nearly double the distance from the ancient brick curb. There is little doubt in my mind that both vases, which stood in front of the altar, on its S.-S.-E. side, one behind the other as one approached it, served some common purpose in connection with the temple service at the pre-Sargonic time.

Another section of earth adjoining the excavation which had yielded these remarkable results was removed by Haynes.

To the S.-E. of the altar described above, almost exactly under the E. corner of Ur-Gur's ziggurrat and immediately below the pavement of Narâm-Sin, stood another interesting structure.[3] It is 3.38 m. high,[4] 7 m. square, "with a symmetrical and double reëntrant angle at its northern corner and built up solidly like a tower." Its splendid walls, which exhibit no trace of a door or opening of any kind, are made of large unbaked bricks of tenacious clay[5] somewhat smaller in size than those of Narâm-Sin's rampart. While examining the surroundings of this building, Haynes found ten basketfuls of archaic water vents and fragments thereof on its S.-E. side and on a level with its foundation. His curiosity was aroused at once, and after a brief search underneath the spot where the greatest number of these terra-cotta vents and cocks had been gathered, he came upon a drain which extended obliquely under the entire breadth of this edifice. At its outer or discharging orifice he found the most ancient keystone arch yet known in the history of architecture. The question once asked by Perrot and Chipiez[6] and answered by them with a "probably not," has been definitely decided by the American expedition in favor of ancient Chaldæa. The bottom of this valuable witness of pre-Sargonic civilization[7] was c. 7 m. below the level of Ur-Gur's crude brick platform, 4.57 m. below the pavement of Narâm-Sin, and 1.25 m. below the foundations of the aforesaid building. The arch is 71 cm. high, elliptical in form, and has a span of 51 cm. and a rise of 38 cm. Cf. Pl. XXVIII,

[1] It stood 3.05 m. below the pavement of Narâm-Sin.

[2] In the form of a large jar, its diameter in the centre being larger than that at the top (Haynes, Report of Aug. 24, 1895).

[3] The following facts have been gathered from Haynes's Reports of Oct. 13, Nov. 24, 1894.

[4] Its foundations are therefore 3.38 m. below the level of Narâm-Sin's pavement.

[5] "Thoroughly mixed with finely cut straw and well kneaded."

[6] *A History of Art in Chaldæa and Assyria*, Vol. II, p. 234.

[7] Haynes, Reports of Oct. 13, 20, Nov. 24, 1894; Jan. 12, March 2, 1895.

No. 73.[1] The bricks of which it is constructed are well baked, plano-convex in shape, and laid in clay mortar, the convex side being turned upward. A few months after its discovery the arch was forced out of shape, "probably from the unequal pressure of the settling mass above it, which had been drenched with rain water."

Whether the altar, the two large vases and the massive building, under which the ancient arch was found, had any original connection with each other, is at present impossible to prove. According to my calculations and our latest news from the field of excavation, the bottom of the lower vase and the foundation of the massive building were not on the same level. The difference between them is nearly 0.5 m. As the highest vase, however, stood 77 cm. above the other, and as the section S.-E. from them has not yet been excavated, it is highly probable that a third vase stood at some distance below the second. However this may be, so much we can infer from the facts obtained even now, that an inclined passage from the plain led alongside the two vases to the elevated enclosure around the solitary altar. I am therefore disposed to assign to the tower-like building, the character of which is still shrouded in mystery, the same age as the altar, curb and vases. The keystone arch and drain, on the other hand, are doubtless of a higher antiquity. Whether the 3200 years given by Nabonidos as the period which elapsed between his own government and that of Sargon I, be correct or not, the arch cannot be placed lower than 4000 B.C., and in all probability it is a good deal older.

The two sections which contained all the buildings and objects described above were carried down to the virgin soil, where water stopped our progress. A third section removed in their neighborhood yielded similar results. But it is impossible to enumerate in detail all the antiquities which were uncovered below the S.-E. side of the ziggurrat. The lowest strata did not furnish any treasures similar to those found in the upper layers; they showed a large proportion of black ashes and fine charcoal mingled with earth, but they also produced many smaller objects of great interest and value, especially fragments of copper, bronze and terra-cotta vessels. Several pieces of baked clay steles, bearing human figures in relief upon their surface, will be treated at another place and time.[2] An abundance of fragments of red and black lacquered

[1] A kind of pointed arch of unbaked brick (60 cm. high and 48 cm. wide at the bottom) was found by Haynes in mound X (cf. Pl. XV), on the S. W. side of the canal bed. From the depth in which it was discovered, Haynes reasoned correctly that it was older than 2000 B.C. From the inscribed objects excavated in connection with it, I determined that it must have existed at the time of the dynasty of Isin (c. 2500 B.C.). In all probability it dates back to Ur-Gur's period. For the wall in which this arch is placed was built of the same sun-dried bricks which compose the body of the ziggurrat (Haynes, Reports of April 27, Dec. 21, 1895). For the general form of this pointed arch cf. Perrot and Chipiez, *l. c.*, p. 229, Fig. 92.

[2] One of them was found at a depth of 7 m. below the pavement of Narâm-Sin and 2.44 m. lower than the bottom of the arch, within about 2 m. of the lowest trace of civilization (Haynes, Report of Sept. 7, 1895). Another was discovered 7.70 m. below Narâm-Sin's pavement (Report of Sept. 14, 1895).

pottery was discovered at a depth of 4.6 m. to 8 m. below the pavement of Narâm-Sin.[1] "Had these pieces been found in the higher strata, one would unhesitatingly declare them of Greek origin, or at least ascribe them to the influence of Greek art." For they are, as a rule, of great excellence and in quality far superior to those found in the strata subsequent to the period of Ur-Gur.

The results of our excavations in the deepest strata of Ekur will change the current theory on the origin and antiquity of the arch, will clear our views on the development of pottery in Babylonia, and will throw some welcome rays on one of the darkest periods of history in the valley of the Tigris and Euphrates. But first of all, they again have brought vividly and impressively before our eyes the one fact that Babylonian civilization did not spring into existence as a *deus ex machina;* that behind Sargon I and Narâm-Sin there lies a long and uninterrupted chain of development covering thousands of years; and that these two powerful rulers of the fourth millennium before Christ, far from leading us back to "the dawn of civilization," are at the best but two prominent figures from a middle chapter of the early history of Babylonia.

[1] A vase of ordinary gray pottery, 23 cm. high, was found 7.40 m. below this pavement "directly beneath the line of the very ancient curb, and near to a perpendicular let fall from the E. corner of the altar." The stratum which produced this vase, according to Haynes, "was literally filled with potsherds of small size and generally brick red in color" (Report of Sept. 14, 1895).

II.

THE INSCRIBED MONUMENTS OF SARGON'S PREDECESSORS.

Although more than 500[1] mostly fragmentary antiquities of Sargon and his predecessors have been excavated in Nuffar, it may at first seem strange that nearly all of them were discovered out of place, above the platform of Ur-Gur. But if we examine the details more closely, we will easily find the explanation of this remarkable fact. Almost all these monuments that, on the basis of strong palæographic evidence and for various other reasons, must be ascribed to this early phase of Babylonian history,[2] were found in a stratum on the S.-E. side of the ziggurrat, between the facing of the latter and the great fortified wall which surrounded the temple. This stratum varies in thickness. "In some places it lies directly upon the crude brick pavement of Ur-Gur, while in other places it reaches a height of c. 1 m. above this platform."[3] Few of the objects found were whole, the mass of them was broken and evidently broken and scattered around on purpose. Most of the fragments are so small that during the last three years it needed my whole energy and patience, combined with much sacrifice of the eyesight, to restore the important inscriptions published on the following pages (particularly Pls. 36–42). The apparent relation in which this stratum stands to a peculiar building in its immediate neighborhood will furnish the key to the problem.

AN ANCIENT TEMPLE ARCHIVE.

Directly below the great fortification wall of the temple to the S.-E. of the ziggurrat, Mr. Haynes discovered recently a room 11 m. long, 3.54 m. wide and 2.60 m. high. It showed nowhere a door or entrance in its unbroken walls, and there can be no doubt "that the room was a vault entered by means of a ladder, stairway or other perishable passage from above." This structure "was erected on the level of Narâm-Sin's pavement," and yet it was made of the same bricks which compose the

[1] Stamped bricks being excluded.

[2] Cf. proof below.

[3] Haynes, Report of Dec. 14, 1895.

body of Ur-Gur's ziggurrat and platform. How is this discrepancy to be explained? By the simple assertion, suggested already by the absence of a door in the walls of the building, that the room was underground, a cellar reaching from the top of Ur-Gur's platform down to the level of Narâm-Sin's pavement.[1] The access from above being on the Ur-Gur level, it is clear that the vault was built by this king himself. Our interest in the unearthed building is still increased by the discovery of another smaller[2] room of exactly the same construction and material below it. Separated from the later vault by a layer of earth and *débris* 60 cm. deep, it lies wholly below the level of Narâm-Sin's platform. In its present form this lower cellar cannot, however, antedate Sargon, nor was it built by this king himself or by his immediate successor. From the fact that the bricks of both rooms are identical "in size, form and general appearance,"[3] and that a brick stamp of Sargon was discovered beneath the foundations of the lower walls, we draw the following conclusions: (1) At the time of Sargon a cellar existed at this very spot, as indicated by the presence of his stamp below the level of his dynasty;[4] (2) Ur-Gur found and used this cellar, but rebuilt it entirely with his own bricks. And as he raised the foundation of his ziggurrat far above the old level, he also raised the walls of the old chamber to the height of his new platform. (3) For some unknown reason—probably because the pressure of the neighboring temple fortifications from above, together with the yearly rains, the principal enemies of Babylonian sun-dried brick structures, had ruined the vault[5]—he changed its foundation afterwards and laid it on a higher level, at the same time widening the space between its two longer walls.

It can be easily proved that this underground building was the ancient storeroom or archive of the temple. "A ledge c. 0.5 m. wide and 0.75 m. above the floor extended entirely around the room, serving as a shelf for the storage of objects in due form and order."[6] "A circular clay tablet together with two small tablets of the ordinary form and five fragments were found on it,"[7] and five brick stamps without handles were lying within its walls. And finally a similar room filled with about 30,000 clay tablets, inscribed pebbles, cylinders, statues, etc., was discovered by de Sarzec, 1894, in a

[1] The height of its walls agrees with the distance between the tops of Ur-Gur's and Narâm-Sin's platforms.

[2] It is only 2.15 m. wide, and the walls are 92 cm. high in their present ruined condition.

[3] Haynes, Report of Dec. 14, 1895.

[4] Cf. above, p. 235, note 2.

[5] On this theory it can be easily explained why a few tablets were found on the ledge of the lower room and brick stamps without handles were discovered on the floor of the same room.

[6] Haynes, Report of Dec. 14, 1895. This ledge existed in both chambers. It was built up with the walls and consisted of crude bricks capped by a layer of burned bricks (Report of Dec. 21, 1895).

[7] In the lower vault (Haynes, Report of Dec. 21, 1895). In the midst of this lower chamber was "a hemispherical basin of pottery set in a rim of stone," the original use of which is still unknown (Report of Dec. 14, 1895).

small mound at Tello,[1] by which the true character of our building is determined beyond question. The French explorer was more fortunate than Mr. Haynes in finding his archive undisturbed, but it will always remain a serious loss to science that the contents of the archive of Tello could not have been saved and kept together.[2]

The vault of Nippur had been robbed by barbarians of the third millennium before Christ, as I infer from the following facts and indications:

1. Nearly all the objects above referred to were excavated from a well-defined stratum in the neighborhood of this storeroom. From the position in which they were found, from the fact that none, except door-sockets in diorite, were whole, and from the extraordinarily small size of most fragments, it becomes evident that the contents of the archive were broken and scattered intentionally, as previously stated.

2. Three of the rulers of the dynasty of Isin built at the temple of Nippur,[3] and an inscribed brick of Ur-Ninib was found among the fragments recovered from this stratum. It is therefore clear that the destruction of the vases, brick stamps, etc., did not antedate Ur-Ninib's government. As no document later than his time has been rescued from this stratum, it is also manifest that the deplorable disaster occurred not too long after the overthrow of his dynasty.

3. The archive existed however as late as the second dynasty of Ur. For Bur-Sin II wrote his name on an unhewn block of diorite, presented to Bêl many centuries before by Lugal-kigub-nidudu, a pre-Sargonic[4] king of Ur and Erech, and turned it into a door-socket for his own shrine in Nippur.[5] That the archive could not have been destroyed in the brief interval between Ur-Ninib and Bur-Sin II, so that the latter might have rescued his block from the ruins, results from a study of the general history of that period, however scanty our sources, and of the history of the city of Nippur at the time of Ine-Sin, Bur-Sin II and Gimil (Ḳât)-Sin[6] in particular. All the

[1] Cf. Heuzey, *Revue d'Assyriologie* III, pp. 65–68. The description of this archive chamber excavated in Tello may find a place here: "Ces plaquettes de terre cuite, régulièrement superposées sur cinq ou six rangs d'épaisseur, remplissaient des galeries étroites, se coupant à angle droit, construites en briques crus et garnies des deux côtés de banquettes, sur lesquelles s'étendaient d'autre couches de semblables monuments. Les galeries formaient deux groupes distincts, mais voisins l'un de l'autre."

[2] The thievish Arabs seem to have scattered their rich harvest everywhere. So far, I have examined about 2000 of these tablets myself. But not less than c. 10,000 have been offered to me for sale by dealers of Asia, Europe and America within the last year. They all come from Tello. Cf. Hilprecht, *Recent Research in Bible Lands*, p. 80.

[3] Cf. Part I, pp. 27 f. and above, p. 230, note 1.

[4] For the proof of this statement cf. below.

[5] Cf. Pl. 13, No. 21, and Part I, "Table of Contents," p. 49. Bur-Sin II repeated only what had been done by Sargon I long before. Cf. Part I, "Table of Contents," p. 47 (No. 1), and below.

[6] That Gimil-Sin was the direct successor of Bur-Sin II follows from Pl. 58, No. 127, and that Ine-Sin was the immediate predecessor of Bur-Sin was inferred by Scheil from a contract tablet (*Recueil* XVII, p. 38, note 3). The mention of the devastation of Shashru on this Tello tablet is only of secondary importance in itself, as the same event

three kings mentioned devoted their attention to the interests of Inlil and Ninlil and other gods worshiped in Nippur, as we learn from excavated bricks and door-sockets (Pl. 12 f.),[1] from two chronological lists (Pl. 55, No. 125, and Pl. 58, No. 127),[2] and from the large number of dated contracts discovered in Tello, Nuffar and other Babylonian mounds.[3] That the country as a whole was quiet and enjoyed peace and prosperity under their government, is evident from the many business contracts executed everywhere in Babylonia and from certain statements contained in them. The constant references to successful expeditions carried on by Ine-Sin against the countries of *Karḫar*^ki^, *Ḫarshi*^ki^, *Simurrum*^ki^,[4] *Lulubu*^ki^, *Anshan*^ki^ and *Shashru*^ki^,[5] by Bur-Sin II

occurred at other times (*e. g.*, in Bur-Sin's sixth year, Pl. 58, No. 127, Obv. 6). But the fact that this conquest is placed between Bur-Sin's accession to the throne and a very characteristic event at the close of Ine-Sin's government (cf. Pl. 55, No. 125, Rev. 18–21) settles the question. Ine-Sin ruled at least forty-one years, according to the chronological list on Pl. 55. As, however, a part of it is wanting, it will be safe to assign a reign of c. 50 years to him. Bur-Sin II ruled at least twelve years (Pl. 58, No. 127), and in all probability not more than sixteen to eighteen years. That the events mentioned on the two tablets are arranged chronologically, is beyond question. For (1) events which happened more than once are quoted in their consecutive order, but often separated from each other by other events which occurred between them. Cf. Pl. 55, Rev. 3 and 10; Rev. 4, 5 and 11, and especially Obv. 5 and Rev. 15 (between the two similar events lie twenty-eight years!). (2) In case a year was not characterized by an event prominent enough to give it its name, such a year is quoted as "joined to" or "following" the previous year in which a certain event took place (*ush-sa*). Cf. Pl. 55, Rev. 7–8, 11–12, 13–14, 16–17, 18–20. (3) As we expect in a list arranged chronologically, Pl. 58, No. 127, opens with "the year in which Bur-Sin became king." If the king accomplished something worth mentioning in the year of his accession, this deed was added. Cf. Pl. 58, No. 127, Rev. 4: *Mu* ^dingir^ *Gimil-* ^dingir^ *Sin lugal Urum*^ki^ *-ma-ge ma-da Za-ap-sha-li*^ki^ *mu-g̀ul-a* "In the year when (Gimil-Sin became king and =) King Gimil-Sin brought evil upon the land of Zapshali."

[1] Cf. also Peters in *The American Journal of Archæology* X, p. 16 f.

[2] Cf. No. 125, Obv. 2, 4, 10, 17, 18 (Ine-Sin), No. 127, Obv. 3, Rev. 3 (Bur-Sin II).

[3] Cf. for the present Scheil in *Recueil* XVII, p. 37 f.

[4] On a tablet in Constantinople written at the time of Ine-Sin, we read the following date: *mu Simu-ur-ru-um*^ki^ *Lu-lu bu*^ki^ *ba-g̀ul.* From the fact that *Simurru* and *Lulubu* are here mentioned together, Scheil (*Recueil* XVII, p. 38) draws the conclusion that "Simuru se trouvait donc dans les mêmes parages que là où la stèle de Zohab fixe le pays de Lulubi." This assertion is by no means proven. The king may have conquered two countries far distant from each other in the same year. I call attention to Scheil's theory in order to prevent conclusions similar to those which for several years were drawn from the titles of Nebuchadrezzar I (col. I, 9–11: *sha danna* ^mâtu^ *Lulubî ushamkitu ina kakki, kâshid* ^mâtu^ *Amurrî, shâlilu Kashshî*) and led to curious conceptions about the land *Amurri* (cf. *e. g.* Eduard Meyer, *Geschichte des Alterthums*, p. 329, and especially Winckler, *Untersuchungen*, p. 37, note 2). Hommel's identification of *Simurru* with *Simyra* in Phenicia is by far more probable (*Aus der babylonischen Altertumskunde*, p. 9).

[5] Pl. 55, No. 125, Rev. 3; resp. Rev. 6, 10; resp. Rev. 4, 5, 11; resp. Scheil, *l. c.*, p. 37 (beginning); resp. Rev. 13; resp. Rev. 21. In connection with Anshan it may be mentioned that Scheil in *Recueil* XVII, p. 38 (especially note 6), translated Pl. 55, No. 125, Rev. 9: *mu dumu-sal lugal pa-te-si An-sha-an*^ki^ *-ge ba-tug* by "année où la fille du roi **devint** patesi dans le pays d'Anshan." Notwithstanding that Hommel (*Aus der babylonischen Altertumskunde*, p. 9) and Sayce (in *The Academy* of Sept. 7, 1895, col. b) reproduce this translation, which grammatically is possible, I reject it on the ground that there is no evidence that in ancient Babylonia women were permitted to occupy the highest political or religious positions independently, and translate: "In the year when the patesi of Anshan **married** a daughter of the king (*tug* = *aḫâzu*, "to take a wife, to marry," cf. Delitzsch, *Assyrisches Handwörterbuch*, p. 42).

against *Urbillum*^{ki}, *Shashru*^{ki} and *Rite-tar*(?)*ḫu*^{ki},[1] and by Gimil (Ḳât)-Sin against *Zapshali*^{ki},[2] testify to the same effect. Moreover, a number of other tablets which belong to members of the same dynasty, but cannot yet be referred to definite kings, mention *Kimash*^{ki}, *Ḫumurti*^{ki} and *Ḫuḫu*(*nu*)*ru*^{ki} [3] as devastated or invaded by Babylonian armies.[4] Several of these cities and districts were situated on the east side of the Tigris and must be sought in Elam and its neighboring countries. We begin now to understand why the Elamites soon afterwards when they invaded Babylonia made such a terrible havoc of the temples and cities of their enemies; they simply retaliated and took revenge for their own former losses and defeats.

4. When the Cassite kings conquered Babylonia, the site of the ancient archive chamber was long forgotten and buried under a thick layer of *débris*. Their own store-room, in which all the votive objects published on Pls. 18–27 and Pls. 60 f., Nos. 133–142, were discovered, was situated at the edge of a branch of the Shaṭṭ-en-Nîl outside of the great S.-E. wall of the temple of Bêl.[5] The destruction of the archive under discussion must therefore have taken place between the overthrow of the second

[1] Pl. 58, No. 127, Obv. 2; resp. Obv. 6; resp. Obv. 7.

[2] Pl. 58, No. 127, Rev. 4.

[3] Cf. Scheil, *l. c.*, p. 38. The city of *Marḫashi* (in N. Syria, according to Hommel, *l. c.*, p 9) is mentioned in connection with a daughter of Ine-Sin on Pl. 55, No. 125, Obv. 14.

[4] In view of all these facts above mentioned, Hommel will doubtless change his view (that the kings of the second dynasty of Ur "were apparently confined to this city, as they did not possess Sumer and also lost Akkad"). That they were not confined to Ur, but possessed the whole south is proven by their buildings in Eridu (I. *R.* 3, No. XII, 1, 2) and in *Nippur* (cf. also the statements of the two chronological lists). If Winckler's theory as to the seat of the *sharrût kibrat irbitti* was generally accepted (Hommel apparently does not accept it), the second dynasty of Ur by this very title would also have claimed N. Babylonia. Whatsoever our position may be as to the meaning of this and other titles, as a matter of fact, the kings of the second dynasty of Ur possessed the south of Babylonia, and it is impossible to believe that kings who were the lords of S. Babylonia and conquered parts of Arabia, Syria, Elam and other districts between the four natural boundaries defined in Part I, p. 25, note 4, and who doubtless in consequence of their conquests assumed the proud title "king of the four quarters of the world," should not have been in the possession of all Babylonia (the case of Gudea is entirely different). The kings of the second dynasty of Ur changed the title of their predecessors, not because they had lost Sumer and Akkad, but because they owned more than the old title indicated. The title of Sumer and Akkad—as I understand its meaning—is practically contained in that of "king of the four quarters of the world" (Part I, pp. 24 f.), and the kings of the second dynasty of Ur dropped it therefore for the same reason as Dungi, when he assumed the title *shar kibrat arba'im* (*Z. A.*, III, p. 94). As to the meanings of the different titles, Hommel (whose latest opinion is briefly stated in *Aus der babylonischen Altertumskunde*, p. 8) and I agree entirely, differing from Winckler especially in his interpretation of *shar kibrat arba'im* and *shar* ^{mâtu}*Shumeri u Akkadî* in the oldest Babylonian inscriptions down to Hammurabi. Notwithstanding that, or rather because I read and studied his *Altorientalische Forschungen* III, pp. 201–243, and all his previous papers on the same subject **sine ira et studio again and again**, I have been unable to convince myself of the correctness of his views. Tiele (*Z. A.*, VII, p. 368), Lehmann (*Shamashshumukîn*, pp. 68 ff.), Hommel (*l. c.*) and I apparently reached similar conclusions on this important question.

[5] Cf. Part I, "Table of Contents," p. 48 (Pl. 8, No. 15). Cf. also Peters in *The American Journal of Archæology* X, p. 15.

dynasty of Ur and the beginning of the Cassite rule in Babylonia. The history of the temple of Bêl during this period is enveloped in absolute darkness. No single monument of the members of the so-called first and second Babylonian dynasties has yet been excavated in Nuffar. Apparently our temple did not occupy a very prominent place during their government. And how could it be otherwise? Their rule marks the period of transition from the ancient central cult of Bêl in Nippur to the new rising cult of Marduk in Babylon. Bêl had to die that Marduk might live and take his place in the religious life of the united country. Even the brief renaissance of the venerable cult of "the father of the gods" under the Cassite sway did not last very long. It ceased again as soon as the national uprising under the dynasty of Pashe led to the overthrow of the foreign invaders, who had extolled the cult of Bêl at the expense of Marduk in Babylon,[1] and to the restoration of Semitic power and influence in Babylonia, until under the Assyrian kings Esarhaddon and Ashurbânapal a last attempt was made to revive the much neglected temple service in the sanctuary of Nippur.

5. The breaking and scattering of the vases point to a foreign invasion and to a period of great political disturbance in the country. No Babylonian despot, however ill-disposed toward an ancient cult, and however unscrupulous in the means taken to suppress it, would have dared to commit such an outrage against the sacred property of the temple of Bêl. In all probability therefore the ancient archive chamber of the temple was ransacked and destroyed at the time of the Elamitic invasion (c. 2285 B.C.), when Kudur-Nankhundi and his hordes laid hands on the temples of Shumer and Akkad. That which in the eyes of these national enemies of Babylonia appeared most valuable among its contents was carried to Susa[2] and other places; what did not find favor with them was smashed and scattered on the temple court adjoining the storehouse. From the remotest time until then apparently most gifts had been scrupulously preserved and handed down from generation to generation. Only those movable objects which broke accidentally in the regular service, or which purposely were buried in connection with religious rites, may be looked for in the lowest strata of Ekur.

AGE OF THE INSCRIBED MONUMENTS.

Having explained why the most ancient documents so far excavated in Nuffar were found in pieces above the platform of Ur-Gur's ziggurrat, I now proceed to determine the general age of these antiquities and their relation to the inscriptions of Sargon I.

[1] Cf. Part I, pp. 30 f.
[2] Cf. Part I, p. 31.

The inscriptions Nos. 86–112 have many palæographic features in common and doubtless belong to the same general period, the precise extent of which cannot be given. Two groups, however, may be clearly distinguished within it, differing from each other principally in the forms used for *mu* (Brünnow, *List* 1222) and *dam* (*ibid.*, 11105). Instead of the two familiar Old Babylonian characters, in *mu* the two pairs of parallel lines found at or near the middle of the horizontal line, sometimes cross each other (Nos. 92, 5; 98, 3; 99, 4; 101, 3, etc.), while *dam* occasionally has a curved or straight line between the two elements of which it is composed (No. 111, 3 and 6; No. 98, 2 and 5; cf. No. 94, 3).[1] This peculiar form of *dam* has so far not been met with outside of a very limited number of inscriptions from Nippur; that of *mu* occurs also on the barrel cylinder of Urukagina,[2] although in a more developed stage. Whenever one of these characters has its peculiar form in an inscription of Nippur, the other, if accidentally occurring in the same inscription, also has its peculiar form as described above (cf. No. 94, 3 and 4; No. 98, 2 (5) and 3; No. 111, 3 and 6). The two characters represent therefore the same period in the history of cuneiform writing, to the end of which the cylinder of Urukagina also belongs. This period has not yet been definitely fixed. As various historical considerations seemed unfavorable to placing this ruler after the other kings of Shirpurla, Jensen provisionally placed him before them;[3] Heuzey was less positive;[4] Hommel[5] and Winckler[6] regarded him as later, while Maspero, without hesitation, but without giving any reasons, made him "the first in date of the kings of Lagash."[7] Aside from the reasons given by Jensen, and a few similar arguments which could be brought forth in favor of his theory, the following palæographic evidence proves the chronological arrangement of Jensen and Maspero to be correct:

1. The peculiar form of *mu* occurs in inscriptions from Nippur which, if deter-

[1] This short line, about the significance of which I refer to my greater work, *Geschichte und System der Keilschrift*, was originally curved, became then straight and was later placed at the end of the character (No. 93, 6; 96, 4; 113, 12), finally developing into a full-sized wedge (De Sarzec, *Découvertes en Chaldée*, Pl. 26, No. 1, col. II, 1; Heuzey in *Revue d'Assyriologie* II, p. 79, No. 1, 13 [a duplicate of this inscription is in M. I. O., Constantinople], and the present work, No. 123, Obverse, 1). Sometimes this line is entirely omitted (No. 112, 6).

[2] De Sarzec, *l. c.*, Pl. 32, col. I, 7; col. II, 1, 4, 12; col. III, 3, 7. The form of *mu* is more developed in Urukagina's inscription, indicating that the latter is somewhat later than the corresponding Nippur texts. On the other monuments of Urukagina the regular Old Babylonian form is used exclusively.

[3] In Schrader's *Keilinschriftliche Bibliothek*, Vol. III, Part 1, p. 8.

[4] Formerly he regarded him as decidedly later than the other kings of Lagash (in De Sarzec, *Découvertes en Chaldée*, pp. 110, 112). More recently he expressed himself as doubtful: "Il en résulte que le roi Ourou-ka-ghi-na doit être tenu, soit pour appartenir à une dynastie antérieure à celle du roi Our-Nina, soit pour avoir, après l'apparition des premiers patési, relevé le titre royal à Sirpourla" (*Revue d'Assyriologie* II, p. 84).

[5] *Geschichte Babyloniens und Assyriens*, pp. 290f.

[6] *Geschichte Babyloniens und Assyriens*, p. 41.

[7] *The Dawn of Civilization*, p. 604.

mined by the character of *dam* alone, must be classified as older than the royal inscriptions of Tello.

2. The form of *mu* employed in Urukagina's cylinder does not occur in any other inscription of Tello. The cylinders are therefore to be regarded as older than the other monuments, if it can be shown that this peculiar form of *mu* represents a more ancient stage of writing[1] and did not originate from an accidental prolongation of certain lines in *mu* by a careless scribe.[2]

3. The very pronounced forms cut in stone vases (as, *e. g.*, found in No. 98, 3; 101, 4; 92, 5, and first of all in No. 94, 4) force us to eliminate the element of accident. But, besides, it can be proved by an analysis of the character *mu* itself that the regular Old Babylonian sign is only a later historical development of a more ancient form. The correct interpretation of the original picture will, at the same time, enable us to catch an interesting glimpse of certain prehistoric conditions in ancient Shumer. According to Houghton,[3] a close relation exists between the character for *mu* and *ḫu* (Brünnow, *l. c.*, 2044) and the first part of the character for *nam* (*ibid.*, 2087). I trust no Assyriologist of recent date has ever taken this attempt at solving a palæographic problem very seriously. The sign for *nam* has no connection with the other two characters and is no compound ideogram, but, in its original form, represents a flying bird with a long neck.[4] Since in Babylonia, as in other countries of the ancient world, the future was foretold by observing the flight of birds, this picture became the regular ideogram for "fate, destiny" (*shîmtu*) in Assyrian. The original picture for *mu*, on the other hand, is no bird, but an arrow whose head formerly pointed downward, and whose cane shaft bears the same primitive marks or symbols of crossed lines as are characteristic of the most ancient form of arrow used in the religious ceremonies of the North American Indians.[5] As the shaft was represented by a single line in Baby-

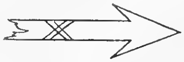
[1] This argument is conclusive, as the theory, according to which later writers occasionally imitate older forms of cuneiform (or linear) characters, in the sense generally understood by Assyriologists, is without any foundation and against all the known facts of Babylonian palæography. Cf. my remarks in Part I, pp. 12f.

[2] Jensen's hesitation, so far as founded upon the form of the character *ka*, can be abandoned, as the form of this character is surely far older than Gudea.

[3] In the *Transactions of the Society of Biblical Archæology* VI, pp. 464f.

[4] This fact becomes evident from a study of the oldest forms in the inscriptions of Tello and Nippur. The original picture is still found on the most ancient Babylonian document in existence, unfortunately scarcely known among Assyriologists. It is (or was) in the possession of Dr. A. Blau and was published by Dr. W. Hayes Ward in the *Proceedings of the American Oriental Society*, October, 1885. The bird represented is therefore no "swallow" (Hommel, *Sumerische Lesestücke*, p. 6, No. 67), but a large bird with a long neck, such as a goose or a similar water bird found on the Babylonian swamps. Later our picture was also used as the ideogram for "swallow," designating her as the flying bird *par excellence*, as the bird nearly always in motion when seen at day time.

[5] As I learned through the courtesy of Mr. Frank Hamilton Cushing of the Bureau of American Ethnology in the Smithsonian Institution at Washington. After a correspondence on this subject it became evident that we had

lonian writing, the original mark carved upon its surface had to be drawn across it. Instead of , we find, therefore, , from which, by shortening the crossed lines, the regular form  developed at a later time. The correctness of this explanation is assured by the otherwise inexplicable absence of an ideogram for *uṣṣu*, "arrow," in Assyrian. For it is impossible to conceive that a people using the bow in their system of writing should have altogether excluded the arrow, which played such a conspicuous *rôle* in the daily life and religious ceremonies of ancient nations in general. But how is it to be explained that our ideogram does not mean "arrow" at all, but signifies "name?" Just as the picture of a flying bird in writing proper was used exclusively with reference to its religious significance, in order to express the abstract idea of "fate, destiny," so the arrow with the marks or symbols of ownership (originally two crossing lines[1]) carved on the shaft became the regular ideogram for "personality" or "name." The same association of ideas led to exactly the same symbolism and usage among the North American Indians, with whom "the arrow" is the symbol of personality.[2] It becomes now very evident that the Babylonian seal-cylinder, with its peculiar shape and use, has developed out of the hollow[3] shaft of an arrow marked with symbols and figures, and is but a continuation and elaboration in a more artistic form of an ancient primitive idea.

From palæographic and other considerations it is therefore certain that Urukagina lived before the ancient kings of Shirpurla, while the inscriptions published in the present work as Nos. 90, 91, 92, 94, 98, 99, 101, 111 are still older than Urukagina. The interval between him and the following rulers of Tello who style themselves "kings" cannot have been very great, however. They all show so many palæographic features in common that they must be classified as an inseparable group. To the

both reached the same conclusions as to the oldest form and significance of the arrow in picture writing by pursuing entirely different lines of research. My arguments, corroborated by Mr. Cushing's own investigations and long residence among tribes which still practice many of the ancient primitive rites and customs, become therefore conclusive in regard to the original form of the character *mu*. I quote from Mr. Cushing's letter the interesting fact that the above-drawn arrow with two pairs of crossing lines on its shaft is called by the Zuñi *a'thlua* "speeder (commander) of all" (namely, of all the other arrows used in their religious ceremonies). A treatise on the ceremonial use of the arrow among the Indians, by Mr. Cushing, is in press.

[1] Still used with the same significance in Europe and America by persons who cannot write, if they have to affix their names to legal documents. The crossed lines on the Indian arrows have a deep religious significance, according to Cushing.

[2] Cf. on this whole subject Culin, *Korean Games*, pp. XXIf. To Prof. Dr. Brinton and Mr. Stuart Culin I am indebted for recent information on this subject.

[3] Because made of bulrushes, growing abundantly along the marshes and canals of lower Babylonia.

same age doubtless belong most, if not all, of the other inscriptions published on Pls. 36–47 (No. 112). I shall prove my theory in detail by the following arguments:

I. Palæographically they exhibit most important points of contact with Urukagina, Ur-Ninâ, Edingiranagin, Enanatuma I, Entemena, Enanatuma II, especially with the first three mentioned.

a. Characteristic signs are identical in these Nippur and Tello inscriptions. Cf., *e. g.*, **gish**, No. 87, col. I, 10, col. II, 37, No. 110, 4 f. e., with the same sign in the texts of Ur-Ninâ and Edingiranagin;[1] **ban**, No. 87, col. I, 10, col. II, 37 (cf. No. 102, 2) with the same sign in the texts of Edingiranagin; **a**, No. 86, 8 (Var.), 1 f. e., No. 87, *passim;* No. 96, 2; No. 104, 3; 106, 4; 110, 8 f. e., 112, 7, with the sign used by Ur-Ninâ, Edingiranagin, Enanatuma I, Entemena (cf. also the present work, No. 115, col. I, 7, col. II, 1, 2, etc.); **shú**, No. 87, col. III, 34 (and Var.) with Urukagina, Edingiranagin; **da**, No. 86, 7, No. 87, col. I, 19, col. II, 18, 20, 29, etc., with the sign used by Ur-Ninâ, Edingiranagin, Entemena; **à** (ID), No. 87, col. II, 41 (Var.) with Entemena (No. 115, col. I, 5); **ta**, No. 87, col. I, 46, col. II, 4, 12, with the same sign used by Urukagina, Ur-Ninâ, Edingiranagin, Entemena; **mà**, No. 88, col. III, 2, with the same sign used by Urukagina, Endigiranagin;[2] **ma**, No. 87, col. II, 40 ff., with the same sign used by Urukagina, Edingiranagin; and many other characters.

b. The script is almost entirely linear like that of Urukagina,[3] Ur-Ninâ and Edingiranagin.

c. They show certain peculiarities in the script, which so far have been observed only in the most ancient texts of Tello: (1) Lines of linear signs running parallel to a separating line (marking columns and other divisions) frequently fall together with this latter so that the character now appears attached to the separating line above, below, to the right or left. Sometimes characters are thus attached to two separating lines at the same time. Cf. No. 87, col. I, 5 (*ma*), 12 (*ka*), col. II, 9 (*shu*), 17 (*la*), 29 (*li*), col. III, 36 (*ur*), No. 106, 2 (*nin*), and many others written on different fragments of No. 87.[4] (2) In accordance with this principle two or more characters

[1] In these quotations, as a rule, I shall abstain from giving the exact passages, as I expect that everybody who examines my arguments has made himself familiar with the palæography and contents of the most ancient inscriptions of Tello before, and to those who have not done so, I do not intend to give introductory lessons in the limited number of pages here at my disposal, in fact for those I do not write.

[2] Also used by Narâm-Sin, cf. No. 120, col. II, 4.

[3] Except of course his barrel cylinder, which has cuneiform characters, as it was inscribed with a stylus.

[4] For this palæographic peculiarity in the inscriptions of Tello, cf. **Urukagina** (De Sarzec, *Découvertes*, Pl. 32, col. II, 9, 10, col. III, 2, 5, col. IV, 3, 9, col. V, 2, 4); **Ur-Ninâ** (De Sarzec, *l. c.*, Pl. 2, No. 2, col. I, 1, 3, *Revue d'Assyriologie* II, p. 84, 3 and 4; p. 147, col. I, 3, 5, col. III, 3, 6, col. IV, 3, 5); **Edingiranagin** (De Sarzec, *l. c.*, Pl. 4, Frag. A, col. I, 6, col. II, 3, 4, 5, 10, etc.; Pl. 31, No. 2, col. I, 1–4, 6, col. II, 1–3, 5, etc.); **Enanatuma I** (*Revue*

standing in close proximity to each other frequently enter into a combination, forming so-called ligatures.[1] Cf. No. 86, 5 Var. (*mà-na*), 8 (*tab-ba*, cf. also Variants), 15 Var. (*ki-gub*); Part I, Pl. 14, 2 (*du-du*); No. 87, col. II, 9 (*ma-shu*), 20 Var. (*da-gà*), 34 (*ki-ag*), 45 (*da-gi*, cf. Var. *gi-gi*),[2] col. III, 21 (*ba-dağ*),[3] 34 (PA [first half of the character *sib*][4]-*gal*); No. 93, 7 (*Shul-pa*);[5] No. 94, 1 (*Nin-din-dug* (?));[6] No. 98, 2 (*dam-dumu*); No. 111, 6 (*na-da*).[7] On the monuments of Tello this tendency to unite two characters into one is almost entirely confined to the inscriptions of Ur-Ninâ.[8] The best illustration is afforded by the writing of the name of his son, Ninâ-shu-banda. The four signs which compose the name are contracted into one large sign, the earliest example of a regular monogram in the history of writing (De Sarzec, *l. c.*, Pl. 2 bis, No. 1). A number of signs which occurred always[9] in the same

d'Assyriologie III, p. 31, 1–5, 9, 11, 14 f.); **Entemena** (De Sarzec, *l. c.*, Pl. 5, Nos. 2, 4 and 5; Pl. 31, No. 3, col. I, 2, 4, 5, col. II, 3 ff.; *Revue d'Assyriologie* II, p. 148, col. I, 1–6, etc.); **Enanatuma II** (De Sarzec, *l. c.*, Pl. 6, No. 4, 2–5, 7 f.) For other examples of Entemena's text in the present work, cf. Nos. 115–117. Apparently Dr. Jastrow had not seen a Tello inscription when he wrote his remark in *Z. A.* VIII, p. 217.

[1] In a limited measure the same peculiarity occurs in several Assyrian inscriptions, c. 3000 years later. Cf., *e. g.*, *i-na*, in the inscription of Tiglathpileser I (I *R.*, 9 ff.), *ina pa*, *Salm. Obel.*, l. 160, 176 (Hilprecht, *Assyriaca*, p. 27, note), etc.

[2] Col. II, 43. *ki-nin Unug^{ki}-gà*, 44. *ganam-ğad-shakir-a-dim*, 45. *shig mu-da-gi-gi*. The last character in l. 38, which remained unidentified for such a long time (cf. Amiaud et Méchineau, *Tableau Comparé*, No. 122, Jensen in Schrader's *K. B.* III, part 1, p. 16, note 4; Scheil in *Recueil* XV, p. 63; Hommel, *Sumerische Lesestücke*, p. 32, No. 376) is identical with Brünnow, *List* 5410. It has in the ancient inscriptions the two values *gà* and *mà* (for the latter cf., *e. g.*, No. 87, col. II, 19 (*kalam-mà*), 29 (*Urum^{ki}-mà*)). On Pl. 50, col. II, 4, read NA-GA = *ishkun* (and col. III, 4 f., KI-GAL (= *kigalla*) *ish-pu-uk*, against Scheil in *Recueil* XV, 62 f.).

[3] Col. III, 19. *nam-ti-mu*, 20. *nam ti*, 21. *ğa-ba-dağ-ği*—"unto my life he may add life."

[4] *PA-gal LU sag gud*, read *sib* (*PA-LU sag-guda-gal*, "the shepherd having the head of an ox" = "the ox-headed shepherd," a synonym of king, according to Jensen.

[5] On the god *Shul pa-ud-du*, cf. Jensen, *Kosmologie*, pp. 126 f., and in Schrader's *K. B.*, III, part I, p. 65, note 11 (*Umun-pauddu*). Oppert read *Dun-pa-e*.

[6] "The goddess who destroys life," an ideogram of Bau or Gula (Brünnow, *List* 11084, cf. III *R.*, 41, col. II, 29–31; III *R.*, 43, col. IV, 15–18, and the present work, Pl. 67, col. III, 1–5). The same deity is mentioned No. 95, 1, No. 106, 1, No. 111, 1. On the value of *dug* cf. Hommel, *Sumerische Lesestücke*, p. 5, No. 55, and p. 12, No. 145.

[7] Cf. No. 99, 5.

[8] Cf. *Revue d'Assyriologie* II, p. 147, col. III, 6 and 7, col. V, 1, 3, 6.

[9] Cf. No. 87, col. I, 5, 40, 42, etc. The linear sign is composed of *e* (canal) + *gi* (reed) and originally denotes a piece of land intersected by canals and covered with reeds (cf. No. 87, col. III, 29). The land *par excellence* with these two characteristic features was to the Babylonians their own country, which therefore was called by the oldest inhabitants *Ki* + *e* + *gi* = *Kengi*, "the land of canals and reeds." From this correct etymology of *Kengi* and its use in the earliest texts (*bar bar Kengi*, No. 87, col. II, 21, and *Enshagsagana en Kengi*, No. 90, 3) it follows that the name does not signify "low-lands" or "Tiefebene" in general in the ancient inscriptions, which alone have to decide its meaning (against Winckler in *Mitteilungen des Akademisch-Orientalistischen Vereins zu Berlin*, 1887, p. 12), but that it is the geographical designation of a well-defined district, **Babylonia proper.** As, however, Babylonia and low-lands are equivalent ideas, *Kengi* could also be used in a wider sense for "low-lands" (*mâtu*) in general.

combination and served to express but one idea or object, were regularly contracted at this early time and became compound ideograms, *e. g.*, *kalama* "country," *gishdin*[1] "wine," etc. (3) Lines of linear signs which run parallel to a separating line are often omitted, even if the sign is not directly connected with this latter. Cf. No.

[1] The peculiar way in which it is written in the oldest inscriptions of Tello, leaves no doubt as to its composition (*gish* + *din*). The analysis of this ideogram by Pinches (*Sign List*, No. 76 a = *kash* + *din*), accepted by Delitzsch (*Assyrisches Handwörterbuch*, p. 354), Jensen (in Schrader's *K. B.* III, part 1, p. 27, note 6), Hommel (*Sumerische Lesestücke*, No 180) and others, must therefore be abandoned. For examples cf. Edingiranagin's inscription unearthed in London (*Proc. Soc. Bibl. Arch.*, Nov. 1890), col. IV, 3, 7, col. V, 3 : *gishdin zu-zu-a;* or Gudea D (De Sarzec, *l. c.*, Pl. 9) : 6. *Ma-gan*ki, 7. *Me-lug̃-g̃a*ki, 8. *Gu-bi*ki, 9. *kur Ni tug*ki, 10. *gu gish mu na gal la-a-an*, 11. *ma* gishru-a *gishdin* (*sic!*), 12. *Shir-pur-la*ki*-shu*, 13. *mu-na-tum*—"Magan, Meluḫa, Gubi, Dilmun, each (*ân*) of which possesses every kind of tree, brought a ship (laden) with timber and wine to Shirpurla." Jensen's question (in Schrader's *K. B.* III, part 1, p. 13, note 12), as to what Amiaud may have read in Ur-Ninâ's inscription (De Sarzec, *l. c.*, Pl. 2, No. 1, col. IV, 1–3, which Jensen left untranslated) is answered by referring him to the Gudea passage just translated, and to *Revue d'Assyriologie* II, p. 147, col. V, 3–6, together with De Sarzec, *l c.*, Pl. 2bis, No. 1 (lower section, characters standing immediately before the king). Amiaud, however (in *Records of the Past*2 I, p. 65), as well as Oppert (in *Revue d'Assyriologie* II, p. 147) and Heuzey (in *Revue d'Assyriologie* III, p. 16, and *Découvertes en Chaldée*, p. 170) wrongly read *gish din* (notwithstanding the passage from Gudea just quoted, lines 6 and 10, where the two respective characters are very different from each other !) as *gan* (*kan*) finding the name of Magan in the first line. The passage reads rather : 1. *ma gishdin*, 2. *kura-ta*, 3. *gu gish gal*, 4. *mu-tum* (?)—"a ship (laden) with wine he brought from the country which possesses every kind of tree." We are now enabled to understand the full significance of Ur-Ninâ's perforated bas relief (De Sarzec, *l. c.*, Pl. 2bis) which remained obscure to Heuzey in his treatise mentioned below. These bas-reliefs and incised slabs (cf. the present work, Pl. XVI, Nos. 37 f.) did not serve "a maintenir dressés, sur des autels ou sur des massifs de briques, divers engins consacrés aux dieux et particulièrement des masses d'armes votives" (Heuzey, *Les Armoiries Chaldéennes de Sirpourla*, pp. 11 f., cf. pp. 6 f.). For they would have been too small and weak for such a purpose. The true facts are rather these : (1) They accompanied donations of any kind made to the temple. But while such donations were consumed in the interest of the temple service (cf. Hilprecht, *Z. A.* VIII, p. 191 f.) or decayed in time (buildings) or died (slaves), etc., these tablets were preserved in the temple as lasting memorials to their munificent donors and served at the same time to induce other worshipers to similar acts of piety. (2) The hole in the middle of the tablets served to fasten it, by the aid of a nail, in the wall or floor of the temple, possibly on the altar itself. (3) The scenes, objects and inscriptions on these tablets generally illustrate and describe the person and work of the donor in relation to his deity. Ur-Ninâ's more elaborate votive tablets (of which the smaller is only an excerpt, cf. De Sarzec, *l. c.*, Pl. 2bis, pp. 168–173), accordingly represent two sides of the king's work undertaken in the service of his god. In the upper section he has the *dupshig* (= *dupshikku*), the symbol of masons, upon his head (exactly as Nabopolasser describes himself in the present work, Pl. 33, col. II, 57 ff.), and is surrounded by his children and page (*Da-ni ta* "at his side" = "page," not "in his hand,"—Oppert in *Revue d'Assyriologie* III, p. 16, note 1). This picture illustrates the accompanying statement : "Ur-Ninâ, king of Shirpurla, son of Nig̃alnigin, built the temple of Ningirsu, built the *abzu banda* (cf. Jensen in *K. B.* III, part 1, p. 13, note ††), built the temple of Ninâ." In the lower section the same king, seated and surrounded by his children and his chief butler (*Sag-antug* "he is the chief"), offers a libation of wine. This picture illustrates the words standing below the cup, "a ship of wine he brought from the country which possesses every kind of tree." The inscription of the bas-relief published by Heuzey in *Les Armoiries Chaldéennes de Sirpourla* reads : 1. *Lag̃* (DU-DU = *abâlu* "to bring," *nazâzu* "to set up"), 2. *sanga* (Brünnow, *List* 5980) *mag̃*, 3. dingir *Nin-gir su-ka*, 4. dingir Nin-gir-*su*, 5. *E-ninnû-ra*, 6. *lag̃*, 7. *sanga* (cf. the present work, No. 87, col. I, 30, and No. 113, 3) dingir *Nin gir-su-ka ge*, 8. . . . . ki*-ta*, 9. *mu-na-ta-ud-du*, 10. GAG + GISH (not *gisal*, Hommel, *Sum. Lesest.*, No. 205) *ura-shu*, 11. *mu-na-gim*—"Gift of the high-priest of Ningirsu to Ningirsu of the temple Eninnû. The gift of the priest of Ningirsu he brought from . . . . and worked it into a . . . ."

86, 3 Var. (*ra*), 4 Var. (*li*), 5 Var. (*na*); No. 87, col. I, 4 (*Unug*), 14 and 20 Var. (*dingir*), 19 Var., col. II, 37 Var., 45, III, 34 Var. (*da*), 40 Var. (*kalama*); col. II, 31 Var. (*gim*); col. III, 2 (*um*), 23, 41 Var. (*à*), 29 (*mà*), 37 Var. (*nam*), etc. Outside of the Nippur texts this peculiarity is almost confined[1] to the inscriptions of Ur-Ninâ. Cf., *e. g.*, De Sarzec, *l. c.*, Pl. 2 bis, No. 2, upper section (*da* in the name of *Abda*), *ibid.* (*Ur* in the name of Ur-Ninâ), *Revue d'Assyriologie* II, p. 147, col. V, 4.

II. The palæographic evidence brought forth is conclusive. Nos. 86, 87 and the other texts referred to above, show all the characteristic features of the inscriptions of Urukagina, Ur-Ninâ and Edingiranagin. But besides they exhibit a number of palæographic peculiarities which are altogether absent from the inscriptions of Tello, and must be regarded as characteristic features of an earlier stage of writing. They will be treated in full at another place.[2] I confine myself here to a brief statement of the following fact. A number of signs have a form representing almost the original picture, others have at least a more original form than the inscriptions from Tello, even those of Urukagina not excepted. Cf. *sum* (No. 87, col. I, 17, the ear of a corn, cf. also l. 45), *gi* (*ibid.*, col. I, 3, a reed, bulrush)[3], *à* (*ibid.*, col. I, 31 in *egi-a*, a tattooed forearm with hand),[4] *bar* (*ibid.*, col. II, 21; No. 98, 4 (the skin of an animal or) a coarse rug),[5] *lah* (*ibid.*, col. 1, 21, water poured out, therefore, "to wash"),[6] *ra* (*ibid.*,

[1] One example is found in a text of Entemena (*ne*, cf. *Revue d'Assyriologie* II, p. 149, col. IV, 2). The way in which *Ur* is written in the name of Urukagina (De Sarzec, *l. c.*, Pl. 32, col. I, 1), furnishes the key to the origin of this peculiarity. For details on this subject I refer to my *Geschichte und System der Keilschrift*, which has been in preparation for the last nine years.

[2] In advance I warn Assyriologists not to regard a fourth palæographic peculiarity (so far confined to these Nippur texts) as a mistake of the scribes: (4) If two linear signs which are to be connected grammatically stand close together in writing, yet without touching each other, frequently one line of the second running parallel to a line in the first is omitted entirely and has to be supplemented from the first sign. Cf. No. 87, col. III, 37: *la*-**ni** (*sic!*), 39: *aga*-**ni** (*sic!*), 40 Var.: *mu*-**na** (*sic!*); No. 103, 3: *mà*-**na** (*sic!*).

[3] In order to obtain a clear conception of the original picture, this sign must not be turned to the left (as Houghton, *l. c.*, p. 473, and others did). For it is a law in cuneiform writing "that the characters are all and always reversed in the same way; what (originally) was the right hand side became (later) the top" (Bertin, *l. c.*, p. 6). The triangle on the left of our picture does not represent the lower end of the stem of a reed, but rather its top or cob. Cf. the corresponding pictures on the Assyrian monuments published in Layard, *The Monuments of Nineveh*, Second Series, *e. g.*, Pl. 12, No. 1 (reproduced by Maspero in *The Dawn of Civilization*, p. 561).

[4] The crossed lines do not represent "an ornamented sleeve" (Bertin, *l. c.*, p. 9), but marks of tattooing (cf. Berger, "Rapport sur les tatouages Tunisiens," in *Revue d'Assyriologie* III, pp. 33–41). The cuneiform sign without these marks means "side" (*da*); with them, it denotes him who is at somebody's side for assistance; he who has the same marks of tattooing upon his arm, therefore has become his "brother." The sign for *shesh*, "brother," denotes a person as the second child of the same family, while the former expresses tribal relations represented by a common symbol.

[5] According to Oppert (*Expédition en Mésopotamie*, Tome II, p. 64) and Bertin (*l. c.*, p. 8) an altar. Impossible! It represents the skin of an animal or better a coarse rug spread upon the ground for persons of rank (and images of deities) to sit upon; in other words, it denotes the place of honor, in exact harmony with the custom prevailing in the tents of Arabia and Mesopotamia to-day. Lehmann (*Shamashshumukin*, p. 122) is therefore correct in giving

col. I, 37 Var., col. III, 15 Var., "canal" + "to fill" (*si* = horn), *i. e.*, "to irrigate"),[1] *lugal* (*ibid.*, col. I, 1–3, the sign shows the remnant of the original arm.[2] Cf. also the ideogram *zag* (*ibid.*, col. I, 3, 38, etc.), *gur* (*ibid.*, col. III, 42 Var.),[3] *Kish* (No. 92, 3; No 102, 3; 103, 4),[4] *ag* (No. 86, 11 and 14),[5] and many others for whose explanation I must refer to my *Geschichte und System der Keilschrift.*[6] All the stone inscriptions of Urukagina have the regular Old Babylonian sign for *mu*,[7] just as the Nippur texts here treated. On the other hand, the Nippur texts have a large number of far more original forms of signs than the Urukagina and Ur-Ninâ inscriptions published.[8] In view of these facts I can only draw one conclusion—that most of these Nippur texts are older than those of Urukagina.

III. Another important fact corroborates my determination of the age of these

to *bara(g)* the original meaning, "seat," instead of "chamber." This sign occurs frequently in the contracts of Nuffar (in a much more developed form) and was identified with *bar* by Scheil independently of me. Cf. *Recueil* XVII, p. 40d.

[6] *Suk(k)allu* denotes the servant (*gal*) who pours out (*su*) [namely water over his master's hands and feet]. A word with similar meaning (*zu*) is apparently contained in *zu-ab*, "ocean," which Hommel translated half correctly "house of water (?)," cf. *Sumerische Lesestücke*, No. 6. Originally *zu* and *su* had the same ideogram, which represents a vessel (cistern?) into which water flows. *Zu* means, therefore, "to flow into," or trans., "to pour into, to add," then figur., "to increase one's knowledge, to learn, to know." *Zu-ab* denotes "the house (abode) into which all the waters flow." *Sukkallu* may be translated "chamberlain" (Kämmerer), later it received a more general meaning.

[1] Oppert already recognized the general significance of the picture (*l. c.*, p. 64). But the exact analysis of the compound ideogram, which I discovered long before we excavated in Nuffar, remained obscure to him, Houghton, Sayce (*Transactions of Soc. Bibl. Arch.* VI, p. 475) and others. Cf. a very curious form, which is but a mutilated "*ra*," in col. I, 37, second Var.

[2] The two elements *lu* + *gal* appear separated in No. 86, 2 Var., 13 Var.; No. 104, 7; No. 105, 7.

[3] Successfully analyzed by Ball in *Proc. Soc. Bibl. Arch.* XV, p. 49. The line which continues beyond the head is, however, no continuation of the forearm, but represents the cushion between the head and the vessel upon which the latter rests. Originally the arm reached further to the rim of the vessel, as in the corresponding Egyptian hieroglyphics and as illustrated by Pl. XVI, No. 37, of the present work.

[4] It closely approaches the original picture explained by a Babylonian scribe on the famous fr. from Kuyunjik, col. III, 6 (*Trans. Soc. Bibl. Arch.* VI, p. 455).

[5] Cf. also the same sign on the very ancient monument preceding Urukagina's time (De Sarzec, *l. c.*, Pl. 1bis b., col. IV, 1).

[6] As I have to dispose of more urgent matters at present, some years may still pass before its publication.

[7] Only his barrel cylinder in clay exhibits traces of the older form for *mu*, as shown above.

[8] Nobody can object that a few characters in these Nippur inscriptions **seem** to show the beginning of wedge-writing and that a few others **seem** to have a later form. Lugalzaggisi presented c. 100 large inscribed vases, all apparently bearing the same long inscription here published, to Inlil of Nippur. Every stonecutter available was employed. Several of them understood but little of writing, and consequently some very ridiculous forms were produced. Cf., *e. g.*, col. II, 16 (second variant), *dug-a* (*sic!*), 29 (second variant) *da*, 39 (variants) *aga*, 42 *gur*, 44 (fourth variant) *ganam*, 45 *shig*, and others. In order to understand the enormous difficulties which I had to overcome in restoring this text, Assyriologists will bear this fact in mind.

inscriptions very strongly. In the inscriptions of Edingiranagin, or Edingiranatum,[1] the grandson of Ur-Ninâ, a city, generally transliterated as *Is-ban*^{ki}, plays a very important *rôle*. In fact the annihilation of the power of this city in S. Babylonia is the one prominent feature which characterizes his government, and to which (in connection with Erech, Ur and some other cities) the king refers again and again.[2] The most interesting object yet found in Tello, the so-called stele of vultures, was doubtless set up by this sovereign in commemoration of his great victory over ^{gish}BAN^{ki}.[3] However this may be, so much is certain that at some time previous to Edingiranagin, a foreign power whose centre was ^{gish}BAN^{ki}, had succeeded in invading and conquering a large portion, if not the whole, of Babylonia, Erech and Ur included. The same city of ^{gish}BAN^{ki} is also mentioned in the long Nippur text No. 87, and here again it occurs in connection with Erech and Ur (and Larsam). We learn at the same time from this very important historical document that Lugalzaggisi, son of a certain Ukush "patesi of ^{gish}BAN^{ki}"[4] (col. I, 3, 9, 10) had conquered all Babylonia and established an empire extending from the Persian Gulf to the Mediterranean Sea, in size therefore not inferior to that founded much later by Sargon I. This first "king of the world" (*lugal kalama*, col. I, 4, 36–41, col. III, 4) of whom Babylonian documents give us information, selected Erech as his capital, and by his great achievements raised ^{gish}BAN^{ki}, his native city, "to great power" (*à maĝ mu-um-gur*, col. II, 41f.). The two documents, Nippur, No. 87, and the stele of vultures from Tello, belong closely together and supplement each other, the one giving a *résumé* of the rise and height of the power and influence of ^{gish}BAN^{ki}, the other illustrating its downfall. The former must therefore antedate the monument of Edingiranagin. As doubtless some time elapsed between the rise and downfall of this foreign power; as, moreover, Shirpurla is not mentioned in Lugalzaggisi's inscription, apparently because it did not as yet exercise any political influence;[5] and finally as palæographically this inscription from Nippur shows more traces of originality than the texts of Urukagina and Ur-Ninâ, as

[1] In view of De Sarzec, *l. c.*, Pl. 31, No. 2, col. III, 5 (*E dingira-na-tum-mà* = "Brought into the house of his god" (by his parents after his birth).

[2] Cf. De Sarzec, *l. c.*, Pl. 3, Fragm. A, col. I, 5, 8, col. II, 4, 13, col. III, 5; Pl. 4, Fragm. A, col. II, 2, 11; Fragm. B, col. III, 3, col. V, 4; Pl. 31, No. 2, col. I, 6.

[3] For details cf. Heuzey's explanation of the figurative representations in his work, *Les Origines Orientales*. pp. 49–84, and in De Sarzec, *l. c.*, pp. 174–184. I agree with this scholar that the people whose defeat is illustrated on this monument belong to the city (and country) of ^{gish}BAN^{ki} (De Sarzec, *l. c.*, pp. 183).

[4] This was the original reading of l. 10; the traces preserved on two fragments establish my text restoration of this line beyond doubt.

[5] The fragment of an inscribed object, apparently dedicated by a king of ^{gish}BAN^{ki} to Ningirsu, was found in Tello (De Sarzec, *l. c.*, Pl. 5, No. 3, and p. 119). From the character used for "king" I draw the conclusion (with Heuzey) that the object belongs to a somewhat later period. Apparently ^{gish}BAN^{ki} played a second important *rôle* in the Babylonian history.

stated above, we are justified in placing Lugalzaggisi before these two rulers of Shirpurla and in regarding most of the inscriptions published as Nos. 86–112 as older than the earliest royal inscriptions from Tello.[1] At any rate, they are not later than these.

A question of fundamental importance for our correct conception of the earliest phase of Babylonian history has been repeatedly discussed within the last ten years: In which relation did Sargon I (and Narâm-Sin) stand to the early kings of Tello? Did he antedate or succeed them? Winckler[2] and Maspero[3] expressed themselves decidedly in favor of the former view,[4] while Hommel,[5] Heuzey[6] and myself (Part I, p. 19),[7] with more or less emphasis placed Sargon I and his son after Ur-Ninâ and Edingiranagin I will now briefly give the definite proof of the validity of our theory.

1. The results of the exploration of the lowest strata of Ekur will have convinced us that Babylonian civilization had a history antedating the kingdom of Sargon I by several thousand years. This pre-Sargonic period must have had a system of writing; for the earliest texts at our disposal, however closely approaching the original picture in a number of cases, presuppose an earlier stage of writing, such as is testified to have existed in Babylonia by the monument "Blau"[8] and by the famous fragments from Kuyunjik.[9] Pieces of inscribed objects unearthed below the Sargon level prove positively that writing existed in Nippur long before Sargon I. It seems, therefore, at the very outset, impossible to believe that not one document antedating the highly developed style of writing in Sargon's monuments should have been excavated in Nuffar or Tello. In fact, it would be altogether unreasonable to regard the inscriptions of Sargon and Narâm-Sin as the first written records of the ancient Babylonian civilization.

2. Everybody who has studied the earliest inscriptions of Babylonia from their originals, and has devoted that special pains to all the details of palæography, which

[1] The little fragment No. 107 cannot be referred to the time of Entemena, the only other ruler of Tello who, according to our present knowledge, presented an inscribed vase to Inlil. Perhaps it is the first indication of the rising of Shirpurla in the South and of the extending of its sphere of influence northward at the expense of *gish*BAN*ki*.

[2] *Untersuchungen*, p. 43; *Geschichte*, pp. 40f. (but cf. on the other side p. 42!); *Altorientalische Forschungen* III, pp. 236ff.

[3] In *Recueil* XV, pp. 65f.; *The Dawn of Civilization*, p. 605, note 3 (end).

[4] Recently adopted by Rogers, *Outlines of the History of Early Babylonia*, Leipzig, 1895, p. 11, note 1 [but given up again after hearing my address, *Contributions to the History of Sargon I and His Predecessors*, before the Oriental Club of Philadelphia].

[5] *Zeitschrift für Keilschriftforschung* II, p. 182; *Geschichte Babyloniens und Assyriens*, p. 291.

[6] Cf., *e. g.*, *Les Origines Orientales*, pp. 50, 84; *Revue d'Assyriologie* III, pp. 54, 57.

[7] Cf. also *Recent Research in Bible Lands*, pp. 66f.

[8] Called so for the sake of brevity. Cf. above, p. 249, note 4.

[9] Published by Houghton in *Trans. Soc. Bibl. Arch.*, p. 454, and reproduced in several other works.

I have a right to expect from those who criticise my statements on this subject, must necessarily come to the conclusion that a much longer period of development lies between Lugalzaggisi, Urukagina, Ur-Ninâ and Edingiranagin, on the one hand, and Sargon and Narâm-Sin, on the other, than between the latter and Ur-Ba'u Gudea, Ur-Gur, etc. It is surely remarkable that Monsieur Heuzey[1] and myself, who have devoted years of constant study to the palæography of the earliest original inscriptions of Babylonia, quite independently of each other, have reached exactly the same conclusions. It is out of regard for the view of those who do not accept Nabonidos' 3200 years as correct, that on palæographic evidence alone I assign to Lugalzaggisi the minimal date of 4000 B.C. My own personal conviction, however, is that he cannot have lived later than 4500 B.C.

3. That my determination of the age of Lugalzaggisi is not too high is proved by the discovery of an uninscribed vase of precisely the same material and characteristic shape[2] as most of the vases which bear Lugalzaggisi's inscription. It was found 1.54 m. below the pavement of Narâm-Sin, and must therefore considerably antedate the rule of the latter.

4. From palæographic and other reasons, I came to the conclusion above, that the inscriptions of Lugalzaggisi and of the other kings, patesis, etc., from Nippur grouped together with them, are surely older than Edingiranagin. Heuzey, on the basis of other arguments, had inferred that the stele of vultures and the reliefs of Ur-Ninâ are "surely older than Narâm-Sin." Hence it would follow, that if Heuzey's judgment of the age of these specimens of art is correct, also the monuments of Lugalzaggisi, etc., antedate Narâm-Sin. I am now in the position to prove the correctness of Heuzey's view beyond question. Since a specimen of the workmanship of the artists at Narâm-Sin's time was recently discovered (cf. Pl. XXII, No. 64), showing exactly the same high degree of execution as the script on his monuments, every Assyriologist is enabled to judge for himself as to the value of Heuzey's judgment. There are, however, a few fragments of a relief in clay lately discovered in Nippur, which must be regarded as the strongest evidence in favor of the French scholar's determination. While Heuzey declared Ur-Ninâ's and Edingiranagin's reliefs to be of greater anti-

[1] It is needless to quote passages from Mr. Heuzey's works in addition to those given on p. 257, note 6. In connection with his discussion of the age of the stele of vultures he makes the emphatic statement, "le type linéaire de l'écriture est assurément plus ancien que celui des inscriptions de Narâm-Sin, etc." (cf. *Les Origines Orientales*, p. 50).

[2] Haynes reported on this vase, August 10, 1895, expressing the hope that I might be able to use it in support of my theory as to the age of most of the other ancient vase fragments from Nippur. He found it covered with earth and black ashes. It consists of white calcite stalagmite and has a very characteristic shape never found at a later period in Nippur again. In general this class of vases resembles a flower-pot, the diameter at the top being larger than that at the bottom, while the walls frequently recede a little at the middle. The size of the above-mentioned vase is: h., 26.5; d. at the top, 18; at the bottom, 14.8; at the middle, 13.8 cm.

quity than Narâm-Sin's monuments, he characterized the relief which opens the splendid series of De Sarzec's finds (Pl. I, No. 1), and has several points of contact with the art exhibited in the stele of vultures, as "plus primitif, même que celui de la grossière tablette du roi Our-Nina" [De Sarzec, *l. c.*, Pl. 1, No. 2], and as "une œuvre d'une antiquité prodigieuse, un monument des plus précieux, que nous devons le placer avec respect tout à fait en tête des séries orientales, comme le plus ancien example connu de la sculpture chaldéenne." These words of a true master of his subject have found a splendid confirmation in the clay reliefs of Nippur just referred to, which in their whole conception and execution show a striking resemblance to the oldest specimen of art recovered from Tello. They were found 7–7.70 m. below the level of Narâm-Sin's pavement, and within about 1.50 m. of the lowest trace of Babylonian civilization.[1] Truly the genius and critical penetration of Heuzey could not have won a more brilliant victory.

5. In connection with my examination of the pre-Sargonic strata of Ekur, I twice called attention to the fact that baked bricks found below Narâm-Sin's pavement are plano-convex in form.[2] I might have added that no other form of baked brick has so far been discovered anywhere in the lowest strata of Nippur, and that these bricks as a rule bear a simple thumb mark upon their convex side. The form of these baked bricks, until the contrary has been proved, must therefore be regarded as a characteristic feature of all structures previous to the time of Sargon I and Narâm-Sin. It is quite in accordance with this view that the only inscribed bricks of Tello which show this peculiar form, bear the legend of Ur-Ninâ, whom on other evidence I placed before Sargon and Narâm-Sin.

6. We draw a final and conclusive argument from a door-socket of Sargon himself. In Part I, Pl. 14, Nos. 23–25, I published three brief legends of a king whom, influenced by Pinches's reading (Garde), I read Gande (pp. 28 ff.), and whom I regarded as identical with Gandash, the founder of the Cassite dynasty. All that I brought forward in favor of this identity I herewith withdraw; when I wrote those

[1] Cf. above, p. 240, note 2. They will be published in Series B of the expedition work edited by myself.

[2] The bricks of the ancient curb around the altar, p. 238, and the bricks of the ancient arch, p. 240. In his report of Oct. 26, 1895, Haynes refers to the discovery of a terra-cotta floor with a rim a little below the pavement of Narâm-Sin. He regards it as a combination of bath and closet, "proving that the present customs and methods of preparing the body for worship, as practiced by Moslems [in the immediate neighborhood of their mosques], is of very great antiquity. The drainage from this floor was conducted into a large vertical tile drain, which is 2 m. long and has an average diameter of 85 cm." This tile drain is "supported by a double course of bricks, plano-convex in form, with finger marks on the convex side." For a specimen of Ur-Ninâ's bricks cf. De Sarzec, *l. c.*, Pl. 31, No. 1. Specimens of this class of Nippur bricks were given by Peters in *The American Archæological Journal* X, p. 34 (two drawings from the hand of the late Mr. Mayer, † 20 Dec., 1894, in Bagdad). The peculiar shape of these bricks in the arch is scarcely distinguishable on Pl. XXVIII of the present work.

pages, I was still somewhat influenced by the current view of Assyriologists, that later kings occasionally imitated older patterns in their script. Since then I have completely shaken off this old theory as utterly untenable when contrasted with all the known facts of Babylonian palæography. The observation, however, which I made on p. 29, note 2, that the characters represent the peculiarities of Ur-Ninâ's inscriptions was entirely correct. Since then a large number of vase fragments have been excavated, by which I was enabled to confirm and strengthen my previous judgment based upon the study of a few squeezes of badly effaced inscriptions and to analyze the palæographic peculiarities of this whole class of ancient texts completely. I arrived at once at the result that the three legends published on Pl. 14 were written by Lugal-kigub-nidudu, "lord of Erech, king of Ur," who left us No. 86. Among other gifts, such as vases, dishes, etc.,[1] this sovereign presented a number of unhewn diorite, calcite, stalagmite and other blocks[2] to the temple as raw material for future use.[3] At the time of Bur-Sin II several of these blocks, of which one is published on Pl. XVII, were still unused.[4] They had been handed down from a hoary antiquity and scrupulously preserved for c. 1500–2000 years in the temple archive. Bur-Sin II selected a diorite block from among them, left the few words of its donor respectfully on its side,[5] turned it into a door-socket, wrote his own inscription on its polished surface and presented it in this new form to the temple. But something similar happened many hundred years before. According to Part I, p. 29, section 1,[6] the same rude inscription is scratched upon the back side of a door-socket of Sargon I. From the analogous case just treated it follows that Lugal kigub-nidudu must have lived even before Sargon I, and consequently that all other inscriptions which have the same palæographic peculiarities as his own can only be classified as pre-Sargonic.

[1] Cf. Pl. XVIII, 40–48.

[2] Cf. Part I, p. 29.

[3] These blocks received therefore only a kind of registering mark scratched merely upon their surface (*Dingir En-lil(-la) Lugal-ki-gub-ni-dudu* (*ne*) *a-mu-na-shub*, "To Inlil L. presented (this" = *ne*)). The inscription on the block, Pl. XVII, No. 39, had originally 8 li. according to the traces left. On the diorite blocks these inscriptions are well preserved; on the calcite blocks however, whose surface corroded and crumbled in the course of six millenniums, they have suffered considerably. Cf. on the whole question of presenting stones as raw material to the temple, Hilprecht in *Z. A.* VIII, pp. 190 ff.

[4] As shown above.

[5] Cf. The curses on the statue B of Gudea, col. VII, 59 ff., on the door-sockets of Sargon, Pl. 1, 12 ff., Pl. 2, 13 ff., on the lapis lazuli block of Kadashman-Turgu, Pl. 24, pp. 14–20. In the latter case the lapis lazuli was likewise presented as raw material to be used in the interest of the temple. But the inscription—this was the intention of the donor—was to be preserved (a thin piece of lapis lazuli being cut off, cf. Pl. XI, No. 25) in remembrance of the gift.

[6] Cf. Part I, "Table of Contents," p. 47.

CONTENTS AND HISTORICAL RESULTS.

In the briefest possible way I will indicate the general results which I draw from a combined study of the most ancient Nippur and Tello inscriptions. With the very scanty material at my disposal this sketch can only be tentative in many points. For every statement, however, which I shall make, I have my decided reasons, which will be found in other places.[1]

At the earliest period of history which inscriptions reveal to us, Babylonia has a high civilization and is known under the name of *Kengi*, "land of the canals and reeds,"[2] which includes South and Middle Babylonia and possibly a part of the North. Its first ruler of whom we know is "*En-shagsag-ana*, lord of Kengi."[3] Whether he was of foreign origin or the shaykh of a smaller Babylonian "city" which extended its influence or the regular descendant of the royal family of one of the larger cities, cannot be decided. It is therefore impossible to say whether he belonged to the Sumerian or Semitic race, or traced his origin to both. That the Semites were already in the country results, aside from other considerations,[4] from the fact that the human figures on the stele of Ur-Enlil, which belongs to about the same period,[5] show the characteristic

[1] In *Assyriaca*, part II, in *Z. A.*, and in response to a repeated invitation from the President and Secretary of the Philosophical Society of Great Britian, in the *Transactions* of the latter society, where I expect to give a more complete sketch of the political and social conditions of ancient Babylonia.

[2] Cf. No. 90, 4 (also No. 87, col. II, 21) and above p. 252, note 9.

[3] His inscriptions (Nos. 90–92) have the oldest form of *mu*, have older forms for *sag* and show other characteristic features of high antiquity. His name signifies "lord is the king of heaven."

[4] Cf. for the present only the important argument drawn from Lugalzaggisi's inscription No. 87, col. III, 33. Here we have the same writing *DA-UR*, which from the inscriptions of Nebuchadrezzar II and other latest Babylonian kings, is known to be a Semiticism for *dâru*. Cf. Delitzsch, *Assyrisches Handwörterbuch*, p. 213.

[5] It has the most ancient forms for *dam* and *mu* and shows a very characteristic feature of the oldest period of writing by contracting the name of *Nin-din dug(-ga)*, or *Ba'u* (cf. above p. 252) into a monogram. The primitive style of art, and such details as the headdress of the god, the short garment of the two persons following the sheep and goat, the nakedness of Ur-Enlil, the fact that his figure and the other two have their hair shaved off, corroborate my determination of the age of this monument. On the other hand, this stele and No. 38 of the same plate, which doubtless belongs to the same age, show us a real Old Babylonian master, who produced a beautiful ensemble with a few simple lines, and knew how to breathe life into his very realistic but very graceful figures. Cf. the great skill he exhibits in his drawing of the graceful outlines of a gazel, and his remarkable knowledge of animal locomotion! The two animals in No. 37 "represent very characteristically two species, the near one a goat and the far one a sheep. The goat shows more characteristics of the wild species of Eastern Persia and Afghanistan than of the Persian, and so may be a domestic hybrid between the two (*i. e.*, *Capra falconerii* and *Capra ægagrus*). The sheep is probably also derived from Eastern Persia and is perhaps the 'urial' *Ovis vignei*, which is an ally of the domestic sheep. It has resemblance also to the Armenian wild sheep *Ovis gmelinii*, but the rugosity of the horns is too great, and the lines are too vertical" (communication from my colleague, Dr. Edward D. Cope, Professor of Zoölogy and Comparative Anatomy, who kindly examined the monument).

features of a mixed race.[1] The capital of this early kingdom is likewise unknown.[2] In all probability it was Erech.[3] The religious centre of Kengi was the sanctuary of Inlil at Nippur.[4] It stood under the especial care of every ruler who claimed supreme authority over the country, and who called himself *patesi gal Inlil*,[5] to define his position as being obtained by divine authority. The chief local administrator of the temple in Nippur seems to have had the title *damkar gal*.[6] This I infer from my analysis of the meaning of *damkar* and from the inscriptions of Nos. 94 and 95 in connection with No. 96, where a certain Aba-Inlil (= *Kîshit-Bêl*) who has the title of *damkar*, presents a vase to Ninlil "for the life of Ur-Inlil, patesi of Nippur."[7] Ur[8] and Larsam[9] and doubtless other places whose names are not yet known from inscriptions, were prominent cities in this early Babylonian kingdom. They had their own sanctuaries, which stood under the control of a *patesi*. This title characterizes its bearer, according to his religious position, as sovereign lord of a temple and chief servant of the god worshiped in it. The fact that a patesi, in addition, often occupied a political position as king or governor, does not interfere with this view. He is first of all the highest official of his god, representing him in his dealings with his subjects; in other words,

[1] Prof. Cope wrote me on this subject: "The shortness of the jaws however is certainly not a Semitic character in human faces, and this character renders the physiognomy very peculiar. The hooked nose and large eyes on the contrary are Semitic. As a result I should say the figures represent an Aryan race with some Semitic tendencies. The identification of such a race is of much interest [indeed it is of vital importance for the whole Sumerian question! —H.]. The people evidently have no Mongolian tendencies."

[2] It may have stood in No. 90, 5, *lugal* . . . . , which is only preserved in part. The traces do not point to the ideogram of *Unug*, more to *kalama*.

[3] Cf. Nos. 86, 4–14; also the fact that Erech is the capital of Lugal-kigub-nidudu and Lugalzaggisi and is prominently mentioned in Edingiranagin's inscriptions. Cf. also Hommel, *Geschichte*, p. 206, and especially p. 300, observe the important position which Erech holds in the titles of the kings of the dynasty of Isin *en* (*shega*) *Unuga*[*ki*] [*N. B.* Winckler's reading of Part I, No. 26, 3, as *Sin-ga-mil*, is an absolute palæographic impossibility. If anything, the reading of this line as *Unug*[*ki*]*-ga-ge* is sure beyond question (against Winckler, *Altorientalische Forschungen* III, p. 274)].

[4] Cf. above, p. 236, and among other points, especially No. 87, col. I, 36–41.

[5] Cf. No. 87, col. I. A similar title occurs in the inscriptions of Tello, *patesi gal Ningirsu* (Entemena and his son Enanatuma). Apparently at an early time the god Ninib received the title *patesi gal Inlil* (Pl. 55, Obv. 17), and the kings and governors were satisfied with the title *patesi Inlil*.

[6] Cf. No. 94: 1. [*Dingir*] *Nin-din-dug*, 2. *Ur-*[*dingir*] *En-lil*, 3. *dam-kar gal*, 4. *a-mu shub*, "To Ba'u Ur-Enlil the chief agent (*scil.* of Inlil) devoted (it)." The current translation of *damkar*, "merchant," is too narrow in many passages. Cf also No. 95: 1. [[*Dingir*] *N*]*in-din-dug-ga* 2. *Ur-Ma-ma* 3. [*d*]*am-kar* 4. [[*ilu*]*E*]*n-*[*lil*] 5. [*a-mu-na shub*], "To Ba'u Ur-Mama, agent of Enlil presented it." For [*dingir*] *Ma-ma* cf. the ideogram of Gula, [*dingir*] *Me-me* in later texts (*e. g.*, Strassmaier, *Cambyses*, 145, 3) and the goddess Mami II *R.* 51, 55[a], and in old Babylonian contracts (the last two references I owe to Jensen). From the fragment of an inscribed stone in Bagdad I copied the phrase "*dam kar* [*dingir*]*DUN-GI*, preceded by the titles of a king of the second dynasty of Ur, and followed by [*dingir*] *Uru*[*ki*]*-ka*.

[7] Cf No. 97, which seems to have been devoted by this very [Ur]-Enlil, patesi of Nippur, to Bêl.

[8] Cf. Nos. 86 and 87, col. II, 30–32, mentioned also by Edingiranagin.

[9] Cf. No. 87, col. II, 33–37.

he is the legitimate possessor of all the privileges connected with this title. These privileges vary according to the sphere of power which a god exercises beyond the limits of his temple or city, and depend chiefly upon the popularity of his cult, the personal devotion and energy of his human representative, and, more than anything else, upon the strength and valor of the city's army. In order to define them accurately, it is first of all necessary to determine the political power of the god's city in each individual case. As soon as we have a clear conception of the latter, we have the key to a correct understanding of the position and privileges of its patesi. But the title itself does not express any reference either to the political dependence or independence of its bearer.[1]

A troublesome enemy of Babylonia at this early period was the city of Kìsh, which therefore did not form part (any longer?) of Kengi proper. It had apparently its own peculiar cult and stood under the administration of a patesi,[2] who was eager to extend his influence far beyond the limits of his city, and sought every opportunity to encroach upon the territory of his southern neighbor. For Kìsh is styled *ǵul shag*[3] "wicked of heart," or *ga ǵul*[4] "teeming with wickedness." The very fact that one

[1] Winckler, *Altorientalische Forschungen* III, pp. 232ff. gives a very good analysis of the relation of a god to his city and of the origin and growth of Oriental states in general, and of the Babylonian kingdom in particular, but his view as to the meaning and use of the word *patesi* is entirely incorrect ("die gebräuchliche Bezeichnung für die unterworfenen Könige ist in Babylonien *patesi*," p. 234). An interesting monument from Tello, recently published by Heuzey in *Revue d'Assyriologie*, serves as an excellent illustration of the correctness of my definition, which I share with Tiele (*Z. A.* VII, p. 373), Hommel (*Geschichte*, p. 294 f.) and other Assyriologists. The inscription to which I refer had defied the united efforts of Oppert, Heuzey and myself for a long while. But I am now able to offer the following correct interpretation. *Sa! Lugal Kish, sanga* ^{ilu}*Nin-su-gir* (*sic!*) ^{ilu}*Nin-su-gir mu-gin, Lugal-kurum-zigum pa-te-si Shir*-[*pur*]-*l*[*a*^{ki}], "Decision! Ninsugir has appointed the king of Kish as priest of Ninsugir. Lugal-kurum zigum is patesi of Shirpurla." This valuable document is important in more than one way. The whole phraseology seems to be Semitic rather than Sumerian (cf. also *sanga* artificial ideogram composed of *sa* + *ga*). The name means *Sharru-kurumat-shamê*, "The king is food of heaven" ("Der König ist Himmelsspeise"). A foreign conqueror of Shirpurla, who is already a king, in addition styles himself patesi of Lagash, expressly declaring that Ningirsu himself, the highest god of the city, called him to fill this office. The condition of affairs is here plain. The conqueror seeks to represent to the people and to the priesthood his violent act as having been committed in the service of their god and carrying out his decision. Therefore he does not call himself king—which he already was—nor *patesi* in the sense of our governor, because he cannot designate himself as his own subject, but *patesi* as the highest official of the god Ningirsu, in the care of his temple and in the administration of that territory over which Ningirsu ruled; in other words, as the legitimate possessor of all the privileges which, up to the time of his conquest, had been connected with this title. Cf. Hilprecht, *Recent Research in Bible Lands*, pp. 71 ff.

[2] Cf. Nos. 108 and 109 (portions of the same vase). The beginning (No. 108) is to be restored as follows: 1. ^{Dingir}*Za*-[*ma-ma*] 2. *U-dug-* . . . . 3. *pa-t*[*e-si*] 4. *Kì*[*sh*^{ki}].

[3] No. 92, 4.

[4] No. 102, 4. *Ga* is written phonetically for *ga*(*n*), Brünnow, *List* 4039, as becomes clear from a comparison of No. 113, 4 with 8 and No. 112, 4. No. 112 reads as follows: 1. ^{Dingir}*Nin-lil* 2. ^{Dingir}*En-lil-la*(*l*) 3. *dumu ad-da-ge* 4. *ga-til-la-shu* 5. *nam-ti* 6. *dam-dumu-na-shu* 7. *a-mu-na-shub*, "To Ninlil and Inlil the son of the ada (*scil.* of the temple of Inlil, No. 113, 6f.) presented it for abundance of life, for the life of his wife and child." Apparently a son

patesi of Kîsh presented a large sandstone vase to Inlil of Nippur, shows us that temporarily he was even in possession of an important part of Kengi, including the sanctuary of Bêl. Enshagsagana himself waged war against his northern enemy, and presented the spoil of this expedition to Inlil of Nippur.[1] The same was done by another king of Kengi, who lived shortly before or after. He infested Kîsh and defeated or even captured its king, Enne-Ugun.[2] "His statue, his shining silver, the utensils, his property," he carried home victoriously, and deposited in the same sanctuary as his

was born unto him, and the happy father presented a vase to the temple. Cf. Jensen in Schrader's *K. B.* III, part 1, p. 25, II (where Jensen and Amiaud, however, misread the name of the donor. As the separating lines clearly prove, the name is not *Ur-Enlil* but *Ur-Enlil-dabi-dudu*). No. 113 reads: 1. *DingirNin-lil-ra* 2. *Uru-na-bada-bi* 3. *sang* (Amiaud et Méchineau, *Tableau*, No. 134) *dingirEn-lil* 4. *gan-til-la-shu* 5. *Ur-Simug* (Amiaud et Méchineau, *l. c.*, No. 117) *-ga* (*dingirSimuga* = Ea!) 6. *dub-sar ada* 7. *e dingirEn-lil-ka-ge* 8. *ga-ti-la-shu* 9. *nam-ti* 10. *ama dug(sic!)-zi-shu* 11. *nam-ti* 12. *dam-dumu-na-shu* 13. *a mu-na-shub*, "To Ninlil Urunabadabi, priest of Inlil, for abundance of life, and Ur-Simuga ('servant of Ea'), scribe of the ada of the temple of Inlil (*ada e* identical with the frequent title of the later contract literature *abu bîti!*), for abundance of life presented it for the life of his (distributive = their!) good and faithful mother, and for the life of his (their) wife and child." Apparently two brothers who held two different positions in the temple of Bêl presented together this beautiful vase for their mother, wives and children. Cf. also No. 106: 1. *DingirNin-d[in] dug-ga* 2. *Nin-en-nu* (cf. *Lugal-en-nu*, No. 114, 5) 3. *ga-til-la-shu* 4. *a-mu-na[-shub]*, "To Ba'u *Ninennu* (for *en-nun* = *naṣâru!*) presented it for abundance of life." My constant transliteration of the postposition "*ku*" by *shu* needs a word of explanation. I believe with Jensen, that no Sumerian postposition *ku* exists, and that the old Babylonian sign of this postposition transliterated by *ku* is rather identical with the character in Part I, Pl. 1, 13; Pl. 2, 13, which I identified as *shu* (*l. c.*, pp. 13 f.).

[1] Cf. Nos. 91 and 92, which supplement each other: 1. [*DingirE*]*n-lil-la* 2. *En-shag-sag-an-na* 3. *nig-ga Kîshki* 4. *ğul shag* 5. *a-mu-na-shub*, "To Inlil E. presented the property of Kîsh, wicked of heart (referring to Kîsh)." In connection with this text I call attention to the fact that the word *namrag* "spoil," the etymology of which was obscure (cf. Part I, p. 21) is purely Sumerian, being composed of *nam*+*ri*+*ag* (V *R.* 20, 13c), corresponding to Assyrian *shallatu shalâlu* (cf. Delitzsch, *Assyr. Gram.*, §§ 73, 132), a synonym of *shallatu* "spoil."

[2] Several vase fragments mention this event, but the whole inscription cannot yet be restored from them. Nos. 103 + 110 belong to the same vase. Nos. 104 and 105, which contain portions of the same inscription and supplement part of the text, belong to two other vases. The fragment of a fourth vase, No. 102, contains part of the same inscription. For C. B. M. 9297, which has remnants of l. 1–4 of No. 102, agrees in thickness, material and characters of writing entirely with Nos. 103 + 110 and belonged doubtless to the same vase. No. 105 had a briefer inscription than the rest. Of the longer inscription the beginning is wanting, the first preserved portion, No. 103, is to be supplemented by No. 104, to be continued by No. 102, 2, and (after a break of several lines) to be closed with No. 110. I restore the inscription as follows: 1. [*DingirEn-lil-la* 2. [*lugal kur-kur-ra* 3. Name of the king 4. [*en Ki-en-gi*] 5. (No. 103 begins) [*lu*]*gal* . . . . 6. *ud dingir*[*En-lil-li*] 6. *mà-na-ni-ğun-a* (cf. No. 86, 1–5) 7. *Kîshki* 8. *mu-ğul* 9. *En-ne-Ugun* (Brünnow, *List* 8862, cf. Jensen in *Z. A.* I, p. 57f.) 10. *lugal Kîshki* 11. *mu-dur* 12. *lugal erim gishBANki-ka-ge* 13. *lugal Kîshki-ge* 14. *uru-na ga* (written phonetically = *gan*, Brünnow, *List* 4039, for cf. No. 113, 4, with 8 and No. 112, 4) *ğul* 15. *nig-ga* 16. . . . . *bil* 17–18 (or more) wanting 19. *mu-ne-gi* 20. *alana-bi* (observe the peculiar sign for *bi* in Nos. 105 and 110!), 21. *azag-zagina-bi* 22. *gish nig-ga-bi* 23. *dingirEn-lil-la* 24. [*E*]*n-lilki-shu* 25. *a mu-na-shub* ["To Inlil, lord of lands, N. N., lord of Shumer (king of Erech)]—when he had looked favorably upon him (= *nashû sha êni*, Brünnow, *List* 10545), he infested Kîsh, he cast down (or bound? cf. Jensen in Schrader's *K. B.* III, part 1, p. 48) Enne-Ugun, king of Kîsh; the king of the hordes of *gishBANki*, king of Kîsh—his city teeming with malignity, the property . . . . he burned, ... he brought back, and his statue, his shining silver, the utensils (*iṣu* = *ânu*, II *R.* 23, 9 e.f.), his property, he presented unto Inlil of Nippur." The reading of the name of the king of Kîsh is of course only provisional. He was apparently a Semite.

predecessor. It is highly interesting to learn from the votive inscription with which the Babylonian ruler accompanied his gift (No. 102), that the king of Kîsh apparently had connections with the city of ^{gish}BAN^{ki}. For he is styled "king of the hosts of ^{gish}BAN^{ki}, king of Kîsh." In other words, we find the two mentioned cities in exactly the same close association as they appear on Edingiranagin's famous stele of vultures. It is therefore evident that the king of Kîsh was not only an ally of ^{gish}BAN^{ki}, but as commander of an army of this country, was in all probability himself a native of ^{gish}BAN^{ki}. In other words, I infer from this and other passages, that Kîsh (which I believe formed originally part of Kengi) at this early time was already under the control of a foreign people, which came from the North, appeared at the threshold of the ancient Sumerian kingdom of *Kengi*, and was constantly pushing southward. Kîsh formed the basis of its military operations, and at this time was, in fact, the extreme outpost of the advancing hordes of ^{gish}BAN^{ki}, serving as a border fortification against Kengi. The success of the Babylonian monarch who defeated Enne-Ugun, cannot have lasted very long. For another king of Kîsh, Ur-Shulpauddu,[1] presented several inscribed vases "to Inlil, lord of lands, and to Ninlil, mistress of heaven and earth, consort of Inlil" (No. 93), and was therefore in the possession of Nippur. He must have dealt a fatal blow to the kingdom of Kengi, for besides his usual title *lugal Kîsh* he assumed another, which unfortunately is broken away.[2] To judge from the analogy of other inscriptions of this period, I have no doubt it contained the acquired land or province of which Kîsh had now become the capital,[3] scarcely, however, *Kengi* itself. How long he ruled, how far his kingdom extended, and whether he was able to hold his conquests, we do not know. So much is certain, the great centre in the North which controlled the movements of its warriors in the South, continued to send out its marauding expeditions against Babylonia. And even if a temporary reaction occasionally should have set in, the weakened South could not withstand the youthful strength and valor of its northern enemies for any length of time. At last ^{gish}BAN^{ki} was prepared to deal the final blow to the ancient kingdom of Kengi, however little of it there may have been left. The son of "Ukush, patesi of ^{gish}BAN^{ki},[4] was this time himself the chief commander of the approaching army. Erech opened its doors, and the rest of Babylonia down to the Persian gulf fell an easy prey to the conquering hero. A hero indeed, Lugalzaggisi was, if we can trust his own long inscription

[1] "Servant of Shulpauddu." The same name occurs occasionally in the early contracts of Nippur and Tello. Cf. Scheil in *Receuil* XVII, p. 41.

[2] Traces of *lugal* are clearly visible in l. 8.

[3] No. 87, col. I, 5.

[4] *I. e.*, "The king is filled with unchangeable power." Cf. *Nimrod Ep.*, 12, 39; *Gilgamesh gitmalu emûku*. The name is possibly to be read Semitic.

of 132 lines,[1] carved over 100 times on as many large vases, which he presented to the old national sanctuary of the country in Nippur.

The titles themselves with which he opens his dedication are a reflex of the great achievements he could boast of: Col. I, 3. "Lugalzaggisi, 4. king of Erech, 5. king of the world, 6. priest of Ana, 7. hero 8. of Nidaba, 9. son of Ukush, 10. patesi of ^{gish}BAN^{ki}, 11. hero 12. of Nidaba, 13–14. he who was favorably looked upon by the faithful eye of Lugalkurkura (*i. e.*, Inlil), 15. great patesi 16. of Inlil, 17. unto whom intelligence was given 18. by Enki[2] (= Ea), 19. he who was called (chosen) 20. by Utu, 21. sublime minister[3] 22. of Enzu (= Sin), 23. he who was invested with power 24. by Utu,[4] 25. fosterer of Ninna, 26. a son begotten 27. by Nidaba, 28. he who was nourished with the milk of life 29. of Nin-ḫarsag,[5] 30. servant of Umu, priestess of Erech, 31. a slave brought up 32. by Nin-a-gid-ga[6]-du, 33. mistress of Erech, 34. the great *abarakku* of the gods."[7] He was one of the greatest monarchs of the ancient

[1] It is the longest complete inscription of the fourth and fifth pre-Christian millenniums so far obtained from Babylonia, and as a historical document of this ancient period it is of fundamental importance. The text published on Pls. 38–42, No. 87, was restored by myself from 88 fragments of 64 different vases under the most trying circumstances. The work was just as much a mathematical task as it was a palæographical and philological problem. On the basis of palæographical evidence I selected c. 150 pieces out of a heap of c. 600 fragments and particles. Then I succeeded in placing the five fragments on Pl. XIX, No. 49, together. By doing this I obtained the beginnings and ends of each column. I noticed that the lines of each of the first two columns must be identical, as the separating lines run from the first to the last column. The difference of the numbers of lines between the second and third lines I could easily determine by a simple calculation. It was more difficult to find out the exact number of lines of which the first and second columns originally consisted. By calculating the original circumference, and making a number of logical combinations, I arrived at the conclusion, which finally proved to be correct, that each of the first two columns had forty-six and the third only forty lines. Then followed the tedious work of arranging the little fragments and determining their exact position, although often enough not more than a few traces of the original characters were left to guide me. I had the complete translation prepared for this volume, but I am obliged to withdraw it from want of space. In the previous and following pages nearly two-thirds of the whole inscription have been treated, according to the passages needed. A complete coherent transliteration and translation will be found in another place very soon. Since the restoration of my text, Haynes has found many duplicates, which in every case confirmed the correctness of my arrangement. Col. III, 25f. can now be restored completely.

[2] Cf. Jensen in Schrader's *K. B.* III, Part 1. The titles of Lugalzaggisi are not unsimilar to those of kings and patesis of Tello.

[3] Cf. above, p. 255, note 6.

[4] One expects rather the ideogram for *shakkanakku* (Brünnow, *List* 9195). *Ne* ("power") + *gish* ("man") apparently is its synonym. Cf. *sag-gish*, I *R.*, 2, No. 5, 1 (and 2), 3; the present work, Part I, No. 81, 7.

[5] Literally "ate" (*akâlu*) or "was filled with" (*shuznunu*).

[6] The variant is a peculiar form of ğa (not = *igi*), cf. col. III, 21, 23 and variants.

[7] No. 87, col. I, 1. ^{Dingir}En-lil 2. *lugal kur kur-ra* 3. *Lugal-zag-gi si* 4. *lugal Unug^{ki}-ga* 5. *lugal kalam-ma* 6. *shib An-na* 7. *galu mağ* 8. *^{dingir}Nidaba* 9. *dumu U-kush* 10. [*pa-t*]*e-si ^{gish}BAN^{ki}* 11. *galu mağ* 12. *^{dingir}Nidaba-ka* 13. *igi zi bar-ra* 14. *^{dingir}Lugal-kur-kur-ra* 15. *pa te-si gal* 16. *^{dingir}En-lil* 17. *gish-PI-SHU-sum-ma* 18. *^{dingir}EN-KI* 19. *mu-pad-da* 20. *^{dingir}Utu* 21. *luğ mağ* 22. *^{dingir}En-zu* 23. *ne-gish* 24. *^{dingir}Utu* 25. *ú-a ^{dingir}Ninna* 26. *dumu tu-da* 27. *^{dingir}Ni-daba* 28. *ga zi ku-a* 29. *^{dingir}Nin-ḫar-sag* 30. *galu ^{dingir}Umu sanga Unug^{ki}-ga* 31. *sag eği-a* 32. *^{dingir}Nin-a-gid-ğa-du* 33. *nin Unug^{ki}-ga-ka* 34. *iti* (?) *mağ* 35. *dingir-ri-ne-ra.*

East, and yet his very name had been forgotten by later generations. He lived long before Sargon I founded his famous empire, and he called a kingdom his own which in no way was inferior to that of his well-known successor, extending from the Persian Gulf to the shores of the Mediterranean. I quote the king's own poetical language: "When Inlil, lord of the lands, invested Lugalzaggisi with the kingdom of the world and granted him success before the world, when he filled the lands with his renown (power) (and) subdued (the country) from the rise of the sun to the setting of the sun—at that time he straightened his path from the lower sea of the Tigris and Euphrates to the upper sea and granted him the dominion of everything (?) from the rise of the sun to the setting of the sun and caused the countries to rest (dwell) in peace."[1] It becomes evident from this passage, in which Lugalzaggisi declares himself to have been invested with the kingdom of the world by Inlil of Nippur, "lord of the lands," that only Nippur can have been the ancient seat of the *sharrût kibrat arba'im*, which manifestly is but the later Semitic rendering of the ancient Sumerian *nam-lugal kalama*. I have examined all the passages in the fresh light of this text and find that Nippur fulfills by far better the required conditions than Kutha or any other city which has been proposed in Northern Babylonia. But, be it remembered, to the early kings of Babylonia this title meant more than a mere possession of the city whose god claimed the right of granting the *sharrût kibrat arba'im*. Down to the time of Hammurabi only those[2] laid claim to this significant title who really owned territory far beyond the north and south of Babylonia, who, in the Babylonian sense of the word, had conquered a *quasi* worldwide dominion, defined by the four natural boundaries (Part I, p. 25). The later Babylonian and Assyrian inscriptions are of value for the determination of the meaning of this title at their own time, but they have little importance for the question as to its origin and earliest localization, if the title must be localized at all hazards.

According to the manner of usurpers,[3] Lugalzaggisi retained Erech, the old metropolis of the country, as his own new capital of this first great Oriental state, of which Kengi became now the chief province. Babylonia, as a whole,[4] had no fault

[1] Col. I, 36. *Ud* ^{dingir}*En-lil* 37. *lugal kur-kur-ra* 38. *Lugal-zag-gi-si* 39. *nam-lugal* 40. *kalam-ma* 41. *mà-na-sum-ma-a* 42. *igi kalam-ma-ge* 43. *si mà-na-di-a* 44. *kur-kur(a)ne na* 45. *mà-ni-sig-ga-a* 46. *Utu e(a)-ta*. Col. II, 1. *Utu shu(a)-shu* 2. *gu mà-na-gar-ra-a* 3. *uda-ba* 4. *a-ab-ba* 5. *sig-ta-ta* 6. *Idigna* 7. *Buranunu*(without determ.)-*bi*(= "and") 8. *a-ab-ba* 9. *igi nim-ma-shu* 10. *gira-bi* 11. *si-mi-na-di* 12. *Utu e(a)-ta* 13. *Utu shu(a)-shu* 14. [^{dingir}*E*]*n-lil-li* 15. . . . . *nin* 16.. . . . . *mu-ni-dug* 17. *kur kur(a) ú sal-la* 18. *mu-da-na*.

[2] Of Dungi we know too little to call him an exception. Of the kings of the second dynasty of Ur, who assumed the proud title, we know now from Pls. 55 and 58 (cf. above, p. 246 and note 4) that they had made conquests as far as Syria and Elam.

[3] Well stated by Winckler, *Altorientalische Forschungen* III, p. 234.

[4] Cf. col. II, 19. *kalam-mà* 20. *a-*^{c}*ul-la mu-da-gà* (= *shakânu*) 21. *bar-bar Ki-en-gi* 22. *pa-te-si kur kur-ra*, etc., etc.

to find with this new and powerful régime. The Sumerian civilization was directed into new channels and prevented from stagnation; the ancient cults between the lower Tigris and Euphrates began to revive and its temples to shine in new splendor. Erech, Ur,[1] Larsa[2] and Nippur[3] received equal attention from their devoted patesi. But first of all, ^{gish}BAN^{ki} itself, the native city of the great conqueror, was raised by his energy and glory to a position of unheard-of influence and political power. Lugalzaggisi stands out from the dawn of Babylonian history as a giant who deserves our full admiration for the work he accomplished. He did not appear unexpectedly on the scene of his activity. We had been prepared for the collapse of the ancient monarchy on the Persian Gulf, with its long but unknown history, by the preceding invasions and victories of the Northern hordes to which he belonged. And yet when suddenly this great empire of Lugalzaggisi stands before our eyes as a *fait accompli*, we can scarcely conceive, whence it came and how it arose.

There is no doubt in my mind that Lugalzaggisi's achievements in Babylonia represent the first signal success of the invading Semites from the North. On the previous pages we have seen how these hordes were pushing gradually southward. After for a number of years they had concentrated their attacks upon the border fortifications of Northern Babylonia and had established a military station and kingdom in Kîsh, it was but a question of time when the whole country in the South had to succumb to their power. The oldest written monuments of Babylonia do not designate these enemies by any single definite name: they are the hordes of the city of ^{gish}BAN^{ki} and Kîsh combined, apparently but two centres of the same powerful people which was roaming over the fertile steppes of Mesopotamia, and whose chief stronghold doubtless was ^{gish}BAN^{ki}. What ancient city, then, is this ^{gish}BAN^{ki}? That we have not to place it "in Susian territory," as Maspero[4] is tempted to do, is beyond question. The ideogram for *lugal* on an inscribed object of Tello and presented by a king of ^{gish}BAN^{ki} (De Sarzec, *l. c.*, Pl. 5, No. 3), points with necessity to the north for the location of our city. As this peculiar form of the character for *lugal* so far has only been found in such cuneiform inscriptions as contain Semitic words written phonetically, or in other texts which are written ideographically, but, on the basis of strong arguments[5] must be read as Semitic, we are forced to the conclusion that this charac-

[1] Col. II, 30–32. *Urum^{ki}-mà guda-gim sag-ana-shu mu-um-gur*, "Ur like a steer he raised to the top of heaven."

[2] Col. II, 33–37. *Larsam^{ki} ur ki-ag ^{dingir}Utu-ge a-ne-g̔ul-la mu-da-gà.* For ^{gisk}BAN^{hi} cf. *ibidem*, 38–42.

[3] As becomes evident from his titles and from the extraordinary number of vases presented to Inlil.

[4] *The Dawn of Civilization*, p. 608. Cf. also Heuzey in De Sarzec, *l. c.*, p. 182.

[5] Cf. for the present above, p. 263, note 1. More on this subject and on "the Semitic influence in early cuneiform writing in general in another place. My above statement is the result of a complete and exhaustive examination of all the published cuneiform material in which the peculiar form of *lugal* occurs.

ter, while doubtless derived from the well-known Sumerian form, was invented and employed by a Semitic nation. Furthermore, I call attention to the important fact that Lugalzaggisi, who was surely a Semite,[1] shows his nationality in various ways, such as the use of certain phrases, which look very suspicious in an ancient Sumerian inscription,[2] and especially in his use of the ideogram *da-ur*, doubtless of Semitic origin (= *dârû*), for "eternal."[3] There is only one ancient place in Northern Mesopotamia which could have been rendered as "the city of the bow" ideographically by the Sumerians, namely **Ḫarran**, with which ^{gish}BAN^{ki} is doubtless identical. For according to Arabic writers, especially *Albîrûni* (ed. Sachau, p. 204),[4] the ground-plot of Ḫarrân resembled that of the moon (*i. e.*, the crescent or half-moon), and Sachau, who gave us the first accurate sketch of this city, finds it very natural that "Arabic writers could conceive the idea of comparing it with the form of the half-moon."[5] Excellent, however, as this Arabic description is, and valuable as it proves for our final location of ^{gish}BAN^{ki}, the ancient Babylonian ideographic rendering as "city of the bow" was a more faithful description of the peculiar way in which Ḫarrân was built than any other, as everybody can easily convince himself by throwing a glance upon Sachau's plan in his *Reise in Syrien und Mesopotamien.* This correct solution of a vexed problem becomes of fundamental importance for our whole conception of the history of the ancient East. First of all, I have furnished a better basis for Winckler's ingenious theory of the original seat of the *sharrût kishshati.* All that could be gathered from later historical sources, beginning with the end of the second millennium before Christ, Winckler brought together to formulate a view which never found much favor with Assyriologists and historians.[6] I opposed it myself[7] on the ground that his reasons proved nothing for the ancient time, because Ḫarrân was never mentioned in a text before the period just stated, and that in view of the total absence of a single

[1] If he did not adopt a Sumerian name when ascending the throne of Kengi and of the "kingdom of the world," which is very probable, the name of the king must be read something like *Sharru-mâli-emûḳi-kênu* (*emûḳu* is masc. and fem. in the singular). But the name cannot be regarded as the prototype of Sargon I (= *Sharru-kênu*), because, aside from other reasons, this kind of abbreviation of a fuller name is without parallel in the history of Assyrian proper names. They are abbreviated at the beginning or end, but not in the middle. Cassite names, etc., are foreign names.

[2] Cf., *e. g.*, "from the lower sea of the Tigris and Euphrates to the upper sea," "from the rising of the sun to the setting of the sun" and others, which remind us forcibly of the phraseology of the latest Assyrian monarchs.

[3] Col. III, 36. *da-ur ge-me*, "he may pronounce (speak) forever!"

[4] Cf. also Mez, *Geschichte der Stadt Ḫarrân in Mesopotamien*, p. 9. The remark of the Arabic writer is therefore more than a "Treppenwitz," and is of great historical importance, showing us that not only the ancient Babylonians but other peoples were struck by the remarkable form in which Ḫarrân was built.

[5] Sachau, *Reise in Syrien und Mesopotamien*, p. 223.

[6] Cf. especially Winckler, *Altorientalische Forschungen* I, pp. 75ff.; III, pp. 201 ff.

[7] Part I, pp. 23 f. I was supported in this, *e. g.*, by Jensen in *Z. A.* VIII, pp. 228 ff.

reference to this city in our whole ancient literature previous to 1500 B. C., we could not speak of it as the seat of a kingdom until we first proved that the city really existed. From the fact that (1) *Kîsh* and *Kish* (*shatu*) did not only sound alike but were even used interchangeably in the inscriptions,[1] (2) that many other ancient Babylonian cities (cf. Shirpurla)[2] are frequently written without a determinative, (3) that the city of Kîsh played a very important *rôle* in the inscriptions of Edingiranagin,[3] (4) that all the ancient empires arose from city kingdoms, and from several other considerations,[4] I inferred that *shar KISH* meant originally "king of Kîsh," a combination which Winckler himself regarded "naheliegend."[5] But notwithstanding the great importance which must be attached to the kingdom of Kîsh in connection with the final overthrow of the ancient empire of *Kengi*, Kîsh was not the principal leader in this whole conquest, but was controlled by a greater power in the North, Ḫarrân, as I have shown above. Having therefore demonstrated the existence of the city of Ḫarrân at the threshold of the fifth and fourth pre-Christian millenniums, which Winckler failed to do, although Edingiranagin's inscriptions, which necessarily formed the starting point of my operations, had been at his disposal for some time, and having furthermore indicated the powerful position which Ḫarrân must have occupied as the great Semitic centre of the ancient Orient, I am now prepared to accept Winckler's theory of the original seat of the *sharrût kishshati* without reserve. I regard the title as the Assyrian equivalent of the Sumerian *nam-lugal kalama*. In view of the leading part that Ḫarrân had taken in the establishment of the first "kingdom of the world" under Lugalzaggisi, Ḫarrân became the seat of the Semitic *sharrût kishshati* just as Nippur was the centre of the Sumerian *nam-lugal kalama*. When after many vicissitudes under Sargon I and Narâm-Sin finally the northern half of ancient Kengi, including Nippur, was definitely occupied by a Semitic population, which spoke and wrote its own language, the old Sumerian title *nam-lugal kalama*, which carried the same meaning for the inhabitants of Babylonia as *sharrût kishshati* did for

[1] Cf. Winckler, *l. c.*, pp. 144 f.

[2] In the inscriptions of Ur-Ninâ written without *ki*.

[3] Not only in his stele of vultures, but also in the inscription unearthed in London (*Proc. Soc. Bibl. Arch.*, Nov., 1890). Hommel was of the opinion (*Die Identität der ältesten babylonischen und ägyptischen Göttergenealogie*, p. 242), that the passage in the latter text escaped my attention. I simply had no use for it: (1) *lugal Kish an ki* is something entirely different from *lugal an-ub-da tab-tab-ba* or *lugal KISH;* for if it was possible to say so in Sumerian, it could only mean "king of the whole heaven and earth," which the king of course did not want to say. (2) The text does not offer this at all, but must be translated *lugal Kîsh^{ki}-bi-na-dib-bi*, "**and** the king of Kîsh," in other words *bi* is copula = "and," connecting *Kîsh^{ki}* with what stood before. Cf. in the present work, Pl. 87, col. II, 7 ("and" the Euphrates).

[4] Cf. Part I, pp. 23 f.

[5] *Altorientalische Forschungen* II, p. 145, note 1.

the Semites of Northern Mesopotamia, disappeared and was translated into the Semitic *sharrût kibrat arba'im.* The later Sumerian *nam-lugal* [an]*ub-da-tab-tab-ba* is nothing but a translation from the Semitic title back into the sacred Sumerian language by Semitic scribes of the third millennium B. C.

Not long after Lugalzaggisi's death a reaction seems to have set in. Sugir generally transliterated as Girsu, which Urukagina or one of his predecessors raised from the obscurity of a provincial town to the leading position in the new kingdom of Shirpurla, must be regarded as the centre of a national Sumerian movement against the Semitic invaders. "The lord of Sugir," *Nin-Sugir*, became the principal god, and his emblem – the lion-headed eagle with outspread wings, occasionally appearing in connection with two lions, which are victoriously clutched in its powerful talons[1]—became the coat-of-arms of the city and characterizes best the spirit of independence which was fostered in its sanctuary. Urukagina's successors, especially Ur-Ninâ, devoted their time to building temples and fortifying the city of Shirpurla and, as faithful patesis, impressed the power and glory of their warlike deity upon their subjects. The cult of Nin-Sugir cannot be separated from the national uprising which started from his sanctuary. Edingiranagin at last felt strong enough to shake off the obnoxious yoke of the Semitic oppressors of Kîsh and Ḫarrân. The decisive battle which was fought must have been very bloody. The Sumerians won it, and they celebrated their victory, which restored a temporary power and influence over the greater part of Kengi to them, in the famous stele of vultures set up by Edingiranagin. Erech and Ur played a prominent part in this national war. The former retained its place as the capital of the *nam-en* (of Kengi), but Ur seems to have furnished the new dynasty, as I infer from No. 86.

Although No. 86 of my published texts belongs doubtless to the same general period as No. 87, a detailed examination of its palæographic peculiarities leads me to place it somewhat later, and to regard it as about contemporary with the inscriptions of the kings of Shirpurla, especially with those of Edingiranagin. We learn from it the following:[2] "When Inlil, the lord of the lands, announced life unto Lugal-kigub-nidudu, when he added lordship to kingdom, establishing Erech as (the seat of) the lordship (the empire) and Ur as (the seat of) the kingdom, Lugal-kigub-nidudu presented this for the great and joyful lot (which he received) unto Inlil, his beloved

[1] Cf. Heuzey's treatise *Les Armoiries Chaldéennes.*

[2] Five different legends have been found of this ruler: (1) A brief legend of three lines (cf. Pl. 14), (2) one of seven or eight lines (cf. Pl. XVII No. 39), (3) one of nineteen lines, (4) an even larger one of c. thirty lines, (5) No. 88. Of the third class a fragment was excavated after the preparation of my plates, which contained the closing lines 17–19. The precise connection between the upper and lower portions on Pl. 37 cannot be given at present.

lord for his life."[1] In Lugal-kigub-nidudu[2] and his son (?) Lugal-kisal-si[3] we have therefore the first representatives of the first dynasty of Ur. Ur-Gur and Dungi, etc., who lived about 1000 years later, must hereafter be reckoned as members of the second dynasty of Ur.[4] The relation of this dynasty to Edingiranagin is shrouded in absolute mystery. It is not impossible that its members ruled before him and were Semites who overthrew the dynasty of Lugalzaggisi.

How long the restored Sumerian influence lasted we do not know. Apparently the Semites were soon again in possession of the whole country. The old name *Kengi* continued to live as an ideogram in the titles of kings, but the name of Shumer, by which Southern Babylonia was known to the later Semitic populations, was derived from the city of *Sugir* or *Sungir*,[5] which was the centre of the national uprising of the South against the foreign invaders from Kîsh and Ḫarrân. Sargon I finally restored what had been lost against Edingiranagin. In his person and work we see but a repetition of that which had happened under Lugalzaggisi centuries before. From the city of Agade,[6] which became the capital of the Sargonic empire, I derive Akkad, the name of Northern Babylonia. The names of Shumer and Akkad are therefore but the historical reflex of the final struggle between the Sumerian and Semitic races, and they were derived from the two cities which took the leading part in it.[7]

[1] 1. *Dingir En-lil.* 2. *lugal kur-kur(a)-ge.* 3. *Lugal-ki-gub-ni-du-du-ra* 4. *ud dingir En-lil-li* 5. *gu-zi mà-na-de-a* 6. *nam-en* 7. *nam-lugal(a)-da* 8. *mà-na-da-tab-ba-a* 9. *Unug ki-ga* 10. *nam-en* 11. *mu-ag-ge* 12. *Urum ki-ma* 13. *nam-lugal* 14. *mu-ag-ge* 15. *Lugal-ki-gub-ni-du-du ne* 16. *nam gal-ĝul-la-da* 17. *dingir En-lil lugal ki-a*[*ga-ni* 18. *nam-ti-la-ni-shu* 19. *a-mu-na-shub*]. The use of *da* = *shu*, "unto, for," in this text is interesting, cf. l. 7 and l. 16. We meet the same use in No. 111: 1. *Dingir Nin-din-dug-ga* 2. *ama nin* 3. *dam* 4. ff. . . . . 3 f. e. *Lugal-shir-ge* 2. f.e. *nam-ti* 1 f. e. *dam- dumu-na-***da** *a-mu-shub.*

[2] "The king finished the place" = *Sharru-manzazu-ushaklil.*

[3] Or *Lugal-si-kisal, i. e.*, "The king is the builder of the terrace," *Sharru shâpik-kisalli.* From the close connection in which *Lugal-kigub-nidudu*, who left many fragments of vases in Nippur, stands with *Lugal-si-kisal* on Pl. 37, No. 86, 11 f. e.—1, I am inclined to regard them as father and son. Cf. also No. 89.

[4] Cf. Hilprecht, *Recent Research in Bible Lands*, p. 67.

[5] Cf. already Amiaud in *The Babylonian and Oriental Record* I, pp. 120 ff. On the reading of *Sugir* instead of *Girsu* cf. also Hommel, *Geschichte*, pp. 290, 292, 296, etc., and Jensen, in Schrader's *K. B.* III, part 1, pp. 11 f. (note).

[6] With George Smith, Amiaud, Hommel and others (against Lehmann, *Shamashshumukin*, p. 73). That *Agade* can go over into *Akkad* philologically, I can prove from other examples. But even if this was not the case, the clear statement of George Smith (cf. Delitzsch, *Paradies*, p. 198) should be sufficient. I cannot admit the possibility of a original mistake on the part of George Smith. Master in reading cuneiform tablets as he was, he could not have made a blunder which would scarcely happen to a beginner in Assyriology.

[7] That Akkad became finally identical with "the Babylonian empire in its political totality and unity," was demonstrated by Lehmann, *l. c.*, pp. 71 ff.

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AND DESCRIPTION OF OBJECTS.

Part II, Plates 36–70 *and XVI–XXX.*

ABBREVIATIONS.

angul., angular; **beginn.**, beginning; **c.**, circa; **ca.**, cast; **C. B. M.**, Catalogue of the Babylonian Museum, University of Pennsylvania (prepared by the editor); **cf.**, confer; **col.**, column(s); **Coll.**, Collection; **d.**, diameter; **Dyn.**, Dynasty; **E.**, East(ern); **f.**, following page; **ff.**, following pages; **f. e.**, from (the) end; **follow.**, following; **fr.** or **fragm.**, fragment(s), fragmentary; **h.**, height; **horizont.**, horizontal; **ibid.**, ibidem; **inscr.**, inscription; **l.** or **li.**, line(s); **m.**, meter; **M. I. O.**, Musée Impérial Ottoman; **N.**, North(ern); **Nippur I, II, III,** etc., refers to the corresponding numbers on Plate XV; **No.**, Number; **Nos.**, Numbers; **Obv.**, Obverse; **omit.**, omitted; **orig.**, original(ly); **p.**, page; **pp.**, pages; **perpend.**, perpendicular; **Pho.**, Photograph; **Pl.**, Plate; **re.** or **resp.**, respectively; **Recueil**, Recueil de travaux relatifs à la philologie et à l'archéologie égyptiennes et assyriennes, edited by G. Maspero; **restor.**, restored; **Rev.**, Reverse; **S.**, South(ern); **sq.**, squeeze; **T.**, Temple of Bêl; **var.**, variants; **vol.**, volume; **W.**, West(ern); **Z.**, Ziqqurratu; **Z. A.**, Zeitschrift für Assyriologie, edited by C. Bezold.

Measurements are given in centimeters, length (height) × width × thickness. Whenever the object varies in size, the largest measurement is given.

The numbers printed on the left, right and lower margins of Plates 36–42 refer to **C. B. M.** and denote the vase fragments used in restoring the cuneiform texts here published. If more than one fragment is quoted, they are arranged according to their relative importance. On fragments placed in parentheses, as a rule less than one or two complete cuneiform characters are preserved. Fragments originally belonging to the same vase are connected by + or + x +, the former indicating that the breaks of fragments thus joined fit closely together, the latter that an unknown piece is wanting between them.

I. AUTOGRAPH REPRODUCTIONS.

PLATE.	TEXT.	DATE.	DESCRIPTION.
36	86	Lugal-kigub-nidudu.	Fragm. of a large vase in serpentine, 20.5 × 9.45 × 2.8, orig. d. c. 25.4. *Nippur* III, beneath the rooms of T. on the S. E. side of Z., a little above Ur-Ninib's pavement in the same stratum as has produced nearly all the fragments of the most ancient stone vases so far excavated in Nuffar (approximately therefore the same place as Pl. 1, No. 1). Inscr. 15 (orig. at least 30) li. C. B. M. 9825. Portions of these 15 li. preserved on the follow. 21 other fragm. of vases in calcite stalagmite (from which the text had been restored before 9825 was found and examined): C. B. M. 9657 + 9607 + 9609 (cf. Pl. XVIII, Nos. 41–43), 9581 + 9643, 9608 + 9679 + 9591 (belonging to the same vase as 9900, cf. Pl. 37 and Pl.

Plate.	Text.	Date.	Description.
			XVIII, No. 47), 9901, 9902, 9903, 9904 (cf. Pl. 37), 9905, 9632 (belonging to the same vase as 9635 + 9620 + 9627 + 9606, cf. Pl. 37), 9605 (cf. Pl. XVIII, No. 44), 9599, 9633, 9680, 9703, 10001 (cf. Pl. XVIII, No. 48). Cf. also 9634 (cf. Pl. 37 and Pl. XVIII, No. 46).
37	86	Lugal-kigub-nidudu.	The same inscr. continued. On the scale of fr. 9325 restored from 16 fragm. of vases in white calcite stalagmite. *Nippur* III, approximately same place as Pl. 36. C. B. M. 10001 (cf. Pl. 36 and Pl. XVIII, No. 48), 9900 (cf. Pl. XVIII, No. 47, belonging to the same vase as 9608 + 9679 + 9591, cf. Pl. 36), 9904 (cf. Pl. 36), 9620 + 9627 + 9635 + 9606 (belonging to the same vase as 9632, cf. Pl. 36), 9604, 9630, 9631, 9917 (red banded), 9639, 9644. Cf. also 9634 (cf. Pl. 36 and Pl. XVIII, No. 46), 9607 (cf. Pl. 36 and Pl. XVIII, No. 41), 9613 (cf. Pl. XVIII, No. 40).
38	87	Lugalzaggisi.	Five fragm. of a vase in white calcite stalagmite (glued together), 16 × 13 × 1.9. *Nippur* III, approximately same place as Pl. 36, No. 86. Inscr. 3 col., 13 + 17 + 8 = 38 li. C. B. M. 9914 + 9910 + 9915 + 9913 + 9320. Cf. Pl. XIX, No. 49. On the basis of these five fragm. the complete text published on Plates 38–42 has been restored by the aid of the follow. 83 other fragm. belonging to 63 different vases: C. B. M. 8614, 8615, 9300, 9301, 9304, 9306, 9307 + x + 9668, 9308, 9309 + 9924 + 9311 + 9316 + 9314 + 9916, 9312 (cf. Pl. XIX, No. 59), 9317, 9318 + 9645, 9583, 9584 + 9315, 9587, 9595, 9598, 9601 + 9305, 9602, 9611 + x + 9610 (cf. Pl. XIX, Nos. 50, 51), 9619, 9624, 9625, 9628 (cf. Pl. XIX, No. 53), 9638, 9642, 9646 + x + 9310, 9651 + 9911, 9654, 9656 + 9685 (cf. Pl. XIX, No. 58), 9659 + 9660 + 9319, 9662 + 9665, 9663, 9666, 9667, 9670, 9671, 9673, 9674, 9683 (cf. Pl. XIX, No. 60), 9687 (cf. Pl. XIX, No. 61), 9689, 9692 (cf. Pl. XIX, No. 56), 9695 (cf. Pl. XIX, No. 57), 9696 + 9637 (cf. Pl. XIX, No. 52), 9697 + x + 9927, 9698, 9700 (cf. Pl. XIX, No. 55), 9701, 9702, 9903, 9905, 9906, 9907, 9908, 9912 + 9658, 9921 + 9313, 9922, 9923, 9925 (cf. Pl. XIX, No. 54), 9926, 9928, 9929.
39	87	Lugalzaggisi.	The same, continued.
40	87	Lugalzaggisi.	The same, continued.
41	87	Lugalzaggisi.	The same, continued.
42	87	Lugalzaggisi.	The same, continued.
42	88	Lugal-kigub-[nidudu].	Fragm. of a vase in white calcite stalagmite, 2.7 × 10 × 2. *Nippur* III, approximately same place as Pl. 36, No. 86. Inscr. 3 col., 1 + 3 + 2 = 6 li. C. B. M. 9900.
42	89	Lugal-kisalsi.	Two fragm. of a vase in white calcite, probably stalagmite (glued together), 4.85 × 4.9 × 2. *Nippur* III, approximately same place as Pl. 1, No. 1. Inscr. 4 li. C. B. M. 9648 a and b. Cf. Pl. 37, No. 86, li. 7–5 f. e.
42	90	En-shagsag(?)-anna.	Fragm. of a vase in white calcite stalagmite, 5.8 × 7.8 × 1.8. *Nippur* III, approximately same place as Pl. 36, No. 86. Inscr. 5 li. C. B. M. 9930.
43	91	En-shagsag(?) anna.	Two fragm. of a vase in white calcite stalagmite (glued together), 4.8 × 5.5 × 1.2. *Nippur* III, approximately same place as Pl. 36,

Plate.	Text.	Date.	Description.
			No. 86. Inscr. 3 (orig. 5) li. C. B. M. 9963 + 9998. For the end of the inscr. cf. Pl. 43, No. 92.
43	92	En-shagsag(?)-anna.	Fragm. of a vase in white calcite stalagmite, 4.5 × 9 × 1.6. *Nippur* III, approximately same place as Pl. 1, No. 1. Inscr. 3 (orig. 5) li. C. B. M. 9618. For the beginn. of the inscr. cf. Pl. 43, No. 91.
43	93	Ur-Shulpauddu.	Two fragm. of a vase in white calcite stalagmite (glued together), 12.5 × 6 × 1. *Nippur* III, approximately same place as Pl. 1, No. 1. Inscr. 8 li. C. B. M. 9616 + 9931 (the former excavated 1890, the latter 1893). Parts of li. 2–7 written also on C. B. M. 9622.
43	94	Ur-Enlil.	Votive tablet in impure bluish gray limestone, round hole in the centre, 2 groups of figures and an inscription incised; 20.6 × 19.3 × 2.6, d. of the hole 3.2. *Nippur* X, found out of place in the loose earth along the S. W. side of the Shatt-en-Nil, c. ½ m. below surface. Between the figures of the upper group 4 li. of inscr., beginning on the right, the last 2 li. separated by a line. Sq. Cf. Pl. XVI, No. 37.
43	95	Ur-Mama.	Fragm. of a vase in brownish limestone with veins of white calcite, 5.8 × 6.9 × 1. *Nippur* III, approximately same place as Pl. 1, No. 1. Inscr. 4 (orig. probably 5) li. C. B. M. 9652.
44	96	Aba-Enlil.	Two fragm. of an alabaster bowl (badly decomposed), 12.2 × 7.2 × 1.1. *Nippur* III, approximately same place as Pl. 1, No. 1. Inscr. 10 li. C. B. M. 9621 + 9617.
44	97	[Ur?]-Enlil.	Fragm. of a vase in white calcite stalagmite, 5.1 × 3.3 × 1.4. *Nippur* III, approximately same place as Pl. 36, No. 86. Inscr. 4 li. C. B. M. 9932.
44	98	Same Period.	Two fragm. of a vase in white calcite stalagmite (glued together), 8.4 × 6.9 × 1. *Nippur* III, approximately same place as Pl. 36, No. 86. Inscr. 7 li. C. B. M. 9952 + 9699 (the former excavated 1893, the latter 1890).
44	99	Same Period.	Fragm. of a vase in white calcite stalagmite, 9.7 × 6.3 × 1.6. *Nippur* III, approximately same place as Pl. 36, No. 86. Inscr. 6 li., beginn. of each li. wanting. C. B. M. 9953.
44	100	Same Period.	Fragm. of a vase in white calcite stalagmite, 3.8 × 5.8 × 1.1. *Nippur* III, approximately same place as Pl. 1, No. 1. Inscr. 2 li. C. B. M. 9636.
44	101	Same Period.	Fragm. of a vase in white calcite stalagmite, 4.2 × 4.5 × 0.5. *Nippur* III, approximately same place as Pl. 1, No. 1. Inscr. 3 li. C. B. M. 9686.
45	102	Time of Ur-Shulpauddu.	Fragm. of a vase in white calcite stalagmite, 8.5 × 9.5 × 2.7. *Nippur* III, approximately same place as Pl. 1, No. 1. Inscr. 7 li. C. B. M. 9614. Parts of li. 1–4 written also on C. B. M. 9297 (dark brown sandstone), which apparently belongs to the same vase as Pl. 45, No. 103 and Pl. 46, No. 110.
45	103	Same Period.	Two fragm. of a vase in dark brown sandstone (glued together), 7.6 × 4.3 × 1.3. *Nippur* III, approximately same place as Pl. 36, No. 86. Inscr. 5 li. C. B. M. 9954 + 9924. To the same vase belongs Pl. 46, No. 110. Text supplemented by the follow. two Nos.

PLATE.	TEXT.	DATE	DESCRIPTION.
45	104	Same Period.	Fragm. of a vase in dark brown tufa (decomposed igneous rock), 7.4 × 7.3 × 1. *Nippur* III, approximately same place as Pl. 36, No. 86. Inscr. 7 li. C. B. M. 9951. Text supplemented by Pl. 45, Nos. 103, 105 and Pl. 46, No. 110.
45	105	Same Period.	Fragm. of a vase in dark brown tufa, 5.4 × 4.9 × 0.8. *Nippur* III, approximately same place as Pl. 1, No. 1. Inscr. 5 li. C.B.M. 9623. Text supplemented by Pl. 45, Nos. 103, 104 and Pl. 46, No. 110.
45	106	Same Period.	Two fragm. of a vase in bluish banded calcite stalagmite (glued together), 4.4 × 6.1 × 0.8. *Nippur* III, approximately same place as Pl. 1, No. 1. Inscr. 4 li. C. B. M. 9682 + 9629.
45	107	A patesi (?) of Shirpurla.	Fragm. of a vase in grayish calcite stalagmite, 3.1 × 5.6 × 0.8. *Nippur* III, approximately same place as Pl. 1, No. 1. Inscr. 2 li. C. B. M. 9597.
46	108	A patesi of Kîsh.	Fragm. of a vase in dark brown sandstone, 13.3 × 7.5 × 1.7. *Nippur* III, approximately same place as Pl. 1, No. 1. Inscr. 4 li. C. B. M. 9572. To the same vase belongs the follow. No.
46	109	A patesi of Kîsh.	Two fragm. of the same vase (glued together), 13 × 14.5 × 1.7. *Nippur* III, approximately same place as previous No. Inscr. 4 li. C. B. M. 9571 + 9577.
46	110	Time of Ur-Shulpauddu.	Three fragm. of a vase in dark brown sandstone (glued together), 16.7 × 11 × 1.5. *Nippur* III, approximately same place as Pl. 1, No. 1. Inscr. 9 li. C. B. M. 9574 + 9575 + 9579. To the same vase belongs Pl. 45, No. 103. Text supplemented by Pl. 45, Nos. 104, 105.
47	111	Time of Ur-Enlil.	Two fragm. of a vase in white calcite stalagmite, orig. h. c. 14, d. at the bottom c. 16.5. Fragm. 9302: 9.5 × 8.9 × 1.9. Fragm. 9600: 8.2 × 11.8 × 1.9. *Nippur* III, approximately same place as Pl. 36, No. 86. Inscr. (beginn. and end) 3 + 3 = 6 li. C. B M. 9302, 9600.
47	112	Time of Ur-Shulpauddu.	Fragm. of a vase in bluish banded calcite stalagmite, inside blackened, 13.2 × 15.4 × 2.3, orig. d. 17.4. *Nippur* III, approximately same place as Pl. 36, No. 86. Inscr. 8 × 4.5, 7 li. C. B. M. 9329.
47	113	A little later.	Fragm. of a vase in brownish gray calcite stalagmite, 17.1 × 11 × 1.35, orig. d. at the centre 17.3. *Nippur* III, approximately same place as Pl. 36, No. 86. Inscr. 10 × 3, 13 li. C. B. M. 9330.
47	114	Same Period.	Fragm. of a vase in white calcite stalagmite, 6.8 × 6.5 × 1.1. *Nippur* III, approximately same place as Pl. 1, No. 1. Inscr. 6 li. C. B. M. 9655.
48	115	Entemena.	Two fragm. of a large vase in white calcite stalagmite, outside blackened, 13.4 × 14.8 × 3. *Nippur* III, approximately same place as Pl. 1, No. 1. Inscr. 2 col., 8 + 6 = 14 li. C. B. M. 9463 + 9690 (both excavated 1890). To the same vase belong the follow. two Nos.
48	116	Entemena.	Fragm. of the same vase, 9.4 × 7.2 × 2.7. *Nippur* III, approximately same place as Pl. 36, No. 86. Inscr. 2 col., 4 + 3 = 7 li. C. B. M. 9328 (excavated 1893).
49	117	Entemena.	Two. fragm. of the same vase, 7.1 × 9.9 × 2.6. *Nippur* III, approximately same place as previous No. Inscr. 2 col., 5 + 2 = 7 li. C. B. M. 9919 + 9920 (both excavated 1893).

Plate.	Text.	Date.	Description.
49	118	Dyn. of Kîsh.	Fragm. of a vase in coarse-grained diorite, 12 × 12.2 × 1.6. *Nippur* III, approximately same place as Pl. 36, No. 86. Inscr. 6 li. C. B. M. 9918.
49	119	Sargon I. (?)	Fragm. of a vase in white calcite stalagmite, 4.8 × 8.4 × 1. *Nippur* III, approximately same place as Pl. 36, No. 86. Inscr. 4 (orig. 6) li. C. B. M. 9331.
50	120	Narâm-Sin.	Fragm. of an inscribed bas-relief in basalt, 52.5 × 39.7 × 8.5. *Diarbekir.* Inscr. 19.1 × 18.4, 4 col., 2 + 6 + 8 + 8 = 24 li. Ca. Orig. M. I. O., Constantinople. Cf. Pl. XXII, No. 64; also Scheil in *Recueil* XV, pp. 62–64, Maspero, *ibid.*, pp. 65f. and *The Dawn of Civilization*, pp. 601f., Hilprecht, *Recent Research in Bible Lands*, pp. 87–89.
51	121	Ur-Gur.	Door socket in a black dense trachytic rock, 41 × 25 × 18. *Nippur* III, 12⅓ m. below surface, underneath the W. corner of the S. E. buttress of Z. Inscr. 19.7 × 7.5, 10 li. Sq.
52	122	Ur-Gur.	Gray soapstone tablet, Obv. flat, Rev. rounded, 12.2 × 7.7 × 1.7. *Nippur* III, approximately same place as Pl. 36, No. 86. Inscr. 5 li. (identical with that on his bricks). C. B. M. 9932. Cf. I R. 1, No. 9.
52	123	Dungi.	Dark gray soapstone tablet, Obv. flat, Rev. rounded, 8.3 × 5.6 × 1.6. *Nippur* X, found out of place in the rubbish at the foot of a mound, c. 1 m. above the surface of the plain. Inscr. 6 (Obv.) + 2 (Rev.) = 8 li. Sq.
53	124	Dungi.	Fragm. of a baked clay tablet, reddish brown with black spots, Obv. flat, Rev. rounded, 20.1 × 18.5 × 4.3. *Tello.* Obv., 6 col. (23 + 30 + 35 + 22 + 22 + 25 =) 157 li. Orig. in M. I. O., Constantinople (Coll. Rifat Bey, No. 242), copied there 1894. Pl. ⅚ of orig. size.
54	124	Dungi.	The same, Rev., 6 col. (21 + 15 + 10 + 27 + 35 + 18 =) 126 li. Copied in Constantinople 1894. Pl. ⅚ of orig. size.
55	125	Ine-Sin.	Two fragm. of a baked clay tablet, light brown (glued together), Obv. flat, Rev. rounded, 12.8 × 6.1 × 2.8. *Nippur* X. Inscr. 19 (Obv.) + 22 (Rev.) = 41 li. Orig. in M. I. O., Constantinople, copied there 1893. Cf. Hilprecht, *Assyriaca*, pp. 22f., Scheil, in *Recueil* XVII, pp. 37f.
56	126	Bur-Sin II.	Baked clay tablet, reddish brown, Obv. flat, Rev. rounded, 20.5 × 19.9 × 3.8. *Tello.* Obv., 7 col. (parts of col. I–III, VI, VII wanting, 32 + 19 + 32 + 31 + 31 + 30 + 21 =) 196 li. Orig. in M. I. O., Constantinople (Coll. Rifat Bey, No. 256), copied there 1894. Pl. ⅚ of orig. size.
57	126	Bur-Sin II.	The same, Rev., 7 col. (part of col. I wanting, 30 + 23 + 21 + 20 + 23 + 15 + 10 =) 142 li. Copied in Constantinople 1894. Pl. ⅚ of orig. size.
58	127	Gimil (Kât)-Sin.	Fragm. of a clay tablet, slightly baked, dark brown, Obv. flat, Rev. rounded, 7 × 5 × 2. *Nippur* X. Inscr. 9 (Obv.) + 4 (Rev.) = 13 li. C. B. M.
58	128	Rim-Aku.	Fragm. of a baked clay phallus, light brown, h. 14.3, largest circumference 14.7. *Nippur* X. Inscr. 17 li. Orig. in M. I. O., Constantinople, copied there 1893.

PLATE.	TEXT.	DATE.	DESCRIPTION.
59	129	Ammizaduga.	Two fragm. of a clay tablet, slightly baked, brown, 11.6 × 10.8 × 3.2. *Nippur* X. Obv., 3 col. of inscr., middle col. Sumerian in Old Babylonian characters, first and third col. Semitic Babylonian in Neo-Babylonian script, Rev. badly damaged, traces of second and third col. The tablet was written c. 600 B.C. Orig. in M. I. O., Constantinople.
60	130	Cassite Dyn.	Fragm. of a slab in white marble with reddish veins, 24.5 × 21 × 6.7. *Nippur* III, approximately same place as Pl. 36, No. 86. Inscr. 2 col., 6 + 5 = 11 li. Ca. (C. B. M. 9794). Orig. in M. I. O., Constantinople.
60	131	c. 2500 B.C.	Brown hematite weight, ellipsoidal and symmetrical, complete, weight 85.5 grams, length 7.3, d. 2.1. *Nippur* X (June, 1895). Inscr. 1.9 × 1.8, 3 li. (1. *X shiḳlu* 2. *dîn ḫurâṣi* 3. *dam-kar* = "10 shekels, gold standard of merchants;" according to this standard 1 mana = 513 gr.). Sq., sent from the ruins.
60	132	Burnaburiash.	Seal cylinder in white chalcedony, length 3.4, d. 1.5. *Babylonia*, place unknown. A bearded standing figure in a long robe, one hand across the breast, the other lifted. A border line at the top. Inscr. 9 li. Impression on gutta percha (in possession of the editor). Orig. in the Metropolitan Museum of Art, New York. Cf. Hilprecht, *Assyriaca*, p. 93, note, Ward, *Seal Cylinders and other Oriental Seals* (Handbook No. 12 of the Metropol. Mus.), No. 391.
60	133	Kurigalzu.	Fragm. of a lapis lazuli disc, 3.2 × 3. *Nippur* X, found in the loose débris on the slope of a mound, and near to its summit (1895). Inscr. 6 (Obv.) + 6 (Rev.) = 12 li. Pencil rubbing, sent from the ruins.
61	134	[Ku]rigalzu.	Fragm. of an agate cameo, 3.95 × 1. *Nippur* III, same place as Pl. 8, No. 15. Inscr. 3 li. Orig. in M. I. O., Constantinople, copied there 1893.
61	135	Kurigalzu.	Fragm. of an agate cameo, 2.8 × 1. *Nippur* III, same place as Pl. 8, No. 15. Inscr. 3 li. Orig. in M. I. O., Constantinople, copied there 1893.
61	136	[Nazi]-Maruttash.	Fragm. of an axe in imitation of lapis lazuli, 6.75 × 4.25 × 1.5. *Nippur* III, same place as Pl. 8, No. 15. Inscr. 7 li. Orig. in M. I. O., Constantinople, copied there 1893. To the same axe belongs the follow. No.
61	137	Nazi-Maruttash.	Fragm. of the same axe, 4.2 × 3.6 × 1.1. *Nippur* III, same place as Pl. 8, No. 15. Inscr. 4 li. Orig. in M. I. O., Constantinople, copied there 1893.
61	138	[Kadashman]-Turgu.	Lapis lazuli disc, 2.75 × 0.3. *Nippur* III, same place as Pl. 8, No. 15, Inscr. of 5 li. (1. *[A-na]^{ilu}Nusku* 2. *be-lì-shú* 3. *[Ka-dash-man]-Tur-gu* 4. *a-[na ba]-l [a-ṭi-sh]ú* 5. *i-[ḳi]-ish*) erased in order to use the material. Orig. in M. I. O., Constantinople, copied there 1893.
61	139	Cassite Dyn.	Agate cameo, hole bored parallel with the li., 2.4 × 1.65 × 0.8. *Nippur* III, same place as Pl. 8, No. 15. Inscr. *^{Dingir}En-lil.* Orig. in M. I. O., Constantinople, copied there 1893.

Plate.	Text.	Date.	Description.
61	140	Cassite Dyn.	Remnant of a lapis lazuli tablet the material of which had been used, 2.1 × 2.2. *Nippur* III, same place as Pl. 8, No. 15. Inscr. 3 li. Orig. in M. I. O., Constantinople, copied there 1893.
61	141	Cassite Dyn.	Lapis lazuli disc, 1.2 × 0.15. *Nippur* III, same place as Pl. 8, No. 15. Inscr. *Dingir Nin-lil.* Orig. in M. I. O., Constantinople, copied there 1893.
61	142	Cassite Dyn.	Lapis lazuli disc, 1.2 × 0.15. *Nippur* III, same place as Pl. 8, No. 15. Inscr. *Dingir En-lil.* Orig. in M. I. O., Constantinople, copied there 1893.
61	143	Cassite Dyn. (?)	Fragm. of a light black stone tablet, 2.15 × 2.4 × 0.5. *Nippur* III, same place as Pl. 8, No. 15. Obv., meaning of characters unknown, Rev., animal rampant. Probably used as a charm. Orig. in M. I. O., Constantinople, copied there 1893. Cf. Loftus, *Travels and Researches*, p. 236f.
62	144	Cassite Dyn.	Unbaked clay tablet, dark brown, Obv., nearly flat, Rev., rounded, 6.15 × 4.75 × 1.8. *Nippur* X. Plan of an estate. Orig. in M. I. O., Constantinople, copied there 1893. Cf. Scheil in *Recueil* XVI, pp. 36f.
62	145	Cassite Dyn.	Fragm. of an unbaked clay tablet, dark brown, Obv. nearly flat, Rev. rounded, 3.8 × 6 × 2.35. *Nippur* X. Plan of an estate. C. B. M. 5135.
63	146	Cassite Dyn.	Six fragm. of a slightly baked clay tablet, brown (glued together), Obv. flat, Rev. rounded, 16.5 × 10.5 × 3. *Nippur* X. Inscr., Obv., 4 col., 39 + 40 + 43 + 15 = 137 li., Rev. uninscribed. Orig. in M. I. O., Constantinople, copied there 1894.
64	147	c. 1400 B.C.	Baked clay tablet, dark brown, nearly flat on both sides, upper left corner wanting, 5.9 × 5.2 × 1.6. *Tell el-Hesy* (Palestine), found by F. J. Bliss, at the N. E. quarter of City III, on May 14, 1892. Inscr. 11 (Obv.) + 2 (lower edge) + 11 (Rev.) + 1 (upper edge) + 1 (left edge) = 23 li., irregularly written. Orig. in M. I. O., Constantinople, copied there 1893. Cf. Pl. XXIV, Nos. 66, 67; also Bliss, *A Mound of Many Cities*, pp. 52–60; Sayce, in Bliss's book, pp. 184–187, Scheil in *Recueil* XV, pp. 137f., Conder, *The Tell Amarna Tablets*, pp. 130–134 (worthless!).
64	148	Marduk-shâbik-zêrim.	Fragm. of a baked clay cylinder, barrel shaped, solid, light brown; h. of fragm. 7.98, orig. d. at the top c. 5.3, at the centre c. 7.8. *Place unknown.* Inscr. 2 (orig. 4) col., 16 + 22 + 1 (margin) = 39 li. Orig. in possession of Dr. Talcott Williams, Philadelphia, Pa. Cf. Pl. XXIV, No. 68; also Jastrow, Jr., in *Z. A.* IV, pp. 301–325, VIII, pp. 214–219, Knudtzon, *ibid.*, VI, pp. 163–165, Hilprecht, *ibid.*, VIII, pp. 116–120, and Part I of the present work, p. 44, note 4.
65	149	Marduk-aḫê-irba.	Boundary stone in grayish limestone, irregular, 48.5 × 24.5 × 18. *Babylonia*, place unknown. Figures facing the right. Upper section: Turtle (on the top of the stone); scorpion, crescent, disc of the sun, Venus (all in the first row below); 2 animal heads with long necks (cf. V R. 57, sect. 4, fig. 1), bird on a post, object similar to V R. 57, sect. 2, with an animal resting alongside (sim-

Plate.	Text.	Date.	Description.
			ilar to V R. 57, sect. 3, fig. 1), same object without animal (all in the second row below); object similar to V R. 57, sect. 6, but without animal (below the 2 animal heads). Lower section: A seated figure, both hands lifted (cf. V R. 57, sect. 5, fig. 1), object similar to V R. 57, sect. 6, last object, but reversed, large snake. Inscr. 3 col., $22 + 23 + 11 = 56$ li. Sq. Orig. in private possession, Constantinople. Cf. Hilprecht, *Assyriaca*, p. 33, Scheil in *Recueil* XVI, pp. 32f. Pl. $\frac{5}{6}$ of orig. size.
66	149	Marduk-aḫê-irba.	The same, continued. Pl. $\frac{5}{6}$ of orig. size.
67	149	Marduk-aḫê-irba.	The same, continued. Pl. $\frac{5}{6}$ of orig. size.
68	150	c. 1100 B.C.	Upper part of a black boundary stone, $33 \times 38 \times 20$. *Nippur.* Inscr. 2 col., $6 + 6 = 12$ li. Ca. Orig. in the Royal Museums, Berlin. Cf. Pl. XXV, No. 69; also *Verzeichniss der (in den Königlichen Museen zu Berlin befindlichen) Vorderasiatischen Altertümer und Gipsabgüsse*, p. 66, No. 213.
69	151	Esarhaddon.	Fragm. of a baked brick, yellowish, partly covered with bitumen, 18.5 (fragm.) $\times$ 7.3 (fragm.) $\times$ 8 (orig.). *Babylon.* Inscr. (written on the edge) 15×6, 11 li. C. B. M. 14.
70	152	Nebuchadrezzar II.	Fragm. of a baked brick from the outer course of a column, 22.2 (fragm.) $\times$ 35 (orig.) $\times$ 9.2 (orig.). *Abu Habba.* Inscr. (written on the outer surface) 33.6×8, 3 col., $8 + 8 + 8 = 24$ li. Sq. Orig. in M. I. O., Constantinople.

II. Photograph (half-tone) Reproductions.

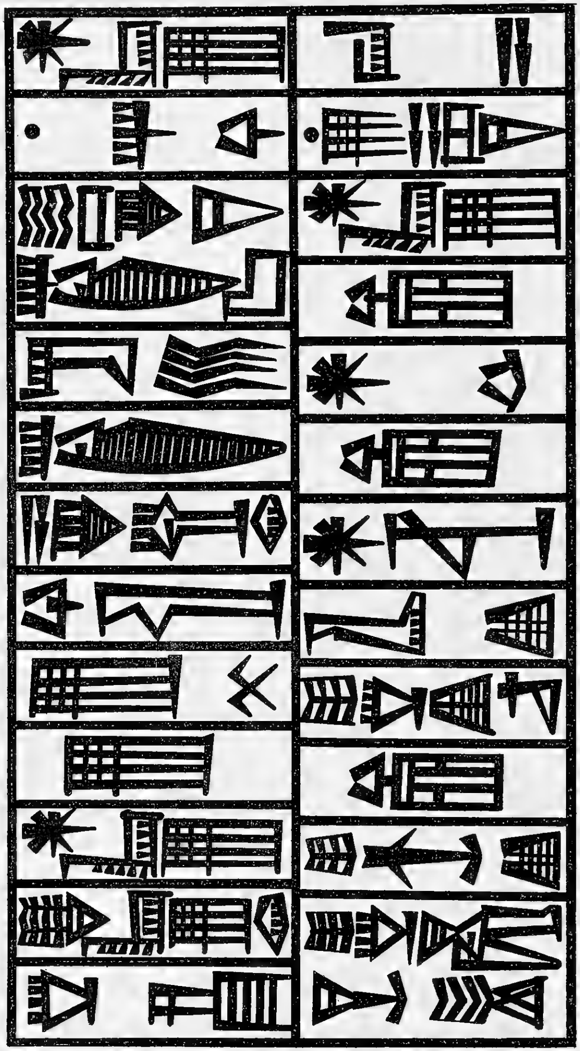
Plate.	Text.	Date.	Description.
XVI	37	Ur-Enlil.	Votive tablet in impure bluish gray limestone, figures and inscription incised. *Nippur.* Upper section: A naked (uncircumcised) worshiper (Ur-Enlil) standing before a seated god and offering a libation. Same group reversed on the left. Between the figures 4 li. of inscr. Lower section: A goat and a sheep followed by two men, one carrying a vessel on his head, the other holding a stick in his right hand. Pho. taken from a sq. Cf. Pl. 43, No. 94.
XVI	38	Same Period.	Two fragm. of a votive tablet in impure bluish gray limestone, round hole in the centre, figures incised, $17.2 \times 18.6 \times 3$, d. of the hole 1.7. *Nippur* III, found out of place, in the débris filling one of the rooms of T. to the S. W. of Z., not far below surface. Upper section: A naked worshiper standing before a seated god and offering a libation. The god reversed on the left. Lower section: A gazel walking by a bush (or nibbling at it?), a hunter about to draw his bow at her. Orig. in M. I, O., Constantinople. Pho. taken from a ca. (C. B. M. 4934).
XVII	39	Lugal-kigub-nidudu.	Unhewn block of white calcite stalagmite, $29 \times 21 \times 19.5$. *Nippur* III, c. 10 m. below surface under the rooms of T. on the S. E. side of Z. Inscr. 10.3×6, 4 (orig. 8?) li. C. B. M. 10050.

PLATE.	TEXT.	DATE.	DESCRIPTION.
XVIII	40–48	Lugal-kigub-nidudu.	Fragm. of vases in white calcite stalagmite, from which (together with others) the text on Plates 36, 37 has been restored. *Nippur.* C. B. M. 9613, 9607 + 9657 + 9609, 9605, 9634, 9900, 9606, 10001. Cf. Plates 36, 37, No. 86.
XIX	49–61	Lugalzaggisi.	Fragm. of vases in white calcite stalagmite, from which (together with others) the text on Plates 38–42 has been restored. *Nippur.* C. B. M. 9914 + 9910 + 9915 + 9913 + 9320, 9611 + x + 9610, 9696 + 9637, 9628, 9925, 9700, 9692, 9695, 9685, 9312, 9683, 9687. Cf. Plates 38–42, No. 87.
XX	62	Al-usharshid.	White marble vase, an inscribed portion (containing parts of li. 8, 9, 11–13 and the whole of li. 10) broken from its side. *Nippur* III, approximately same place as Pl. 36, 37, No. 86. Inscr. 20.6 × 5.6, 13 li. Orig. in M. I. O., Constantinople. Pho. taken from a ca. (C. B. M. 9793). Cf. Pl. 4, No. 5 and Pl. III, Nos. 4–12.
XXI	63	Sargon I.	Fragm. of a brick of baked clay, yellowish, 23.5 (fragm.) × 18 (fragm.) × 8 (orig.). *Nippur* III, found out of place on the S. E. side of Z., approximately at the same depth as Pl. 36, No. 86. Inscr. (written) 3 li. (orig. 2 col., 6 li.). The character *Shar* repeated on the upper left corner of inscribed surface. Orig. in M. I. O., Constantinople. Cf. Pl. 3, No. 3.
XXII	64	Narâm-Sin.	Fragm. of an inscribed bas-relief in basalt. *Diarbekir.* A god standing on the right, clad in a hairy garment, wearing a conical head-dress. Hair arranged in a net, long pointed beard, bracelets on both wrists, short staff (?) in each hand. Part of hair, left upper arm and both legs wanting. Pho. taken from a ca. (C. B. M. 9479). Cf. Pl. 50, No. 120.
XXIII	65	Ur-Ninib.	Brick of baked clay, light brown, broken, 31 × 15 × 7. *Nippur* III, c. 10 m. below surface underneath the S. E. buttress of Z. from a pavement constructed by Ur-Ninib. Inscr. (written) 22.4 × 10, 13 li., beginning at the bottom. Orig. in M. I. O., Constantinople. Cf. Pl. 10, No. 18.
XXIV	66, 67	c. 1400 B.C.	Tablet of baked clay, Obv. and Rev. *Tell el-Hesy* (Palestine). Pho. taken from a ca. (in possession of the editor). Cf. Pl. 64, No. 147.
XXIV	68	Marduk-shâbik-zêrim.	Fragm. of a baked clay cylinder, barrel shaped, solid, light brown. *Place unknown.* Pho. taken from a ca. (C. B. M. 9553). Cf. Pl. 64, No. 148.
XXV	69	c. 1100 B.C.	Upper part of a black boundary stone. *Nippur.* Upper section: Disc of the sun, crescent, Venus. Lower section: 2 col. of inscr. Pho. taken from a ca. (in possession of the editor). Cf. Pl. 68, No. 150.
XXV	70	Unknown.	Brown sandstone pebble (weight?), oblong, flat on both ends, weight 1067 grams, 8.2 × 14.7 × 6. *Nippur*, on S. E. side of Z., 2½ m. below surface. Meaning of characters inscribed on convex surface not certain, possibly "⅚ of a mine + 15" = 55 shekels (equal to c. 1054 grams, if referring to the Babylonian heavy silver mine [royal norm = 1146.1–1150.1 gr., according to

Plate.	Text.	Date.	Description.
			Lehmann in *Actes du huitième congrès international des orientalists*, 1889, Semitic section B, p. 206]). C. B. M. 10049.
XXVI	71	c. 350 B.C.	Bas-relief in baked clay, brown, upper corner and part of lower left corner wanting, $14.3 \times 17 \times 3.7$. *Nippur* III, approximately same place as Pl. XVI, No. 38. Man fighting a lion. Bearded man with a conical head-dress and mass of locks falling over his neck, clad in a short, tight, sleeveless, fringed coat, his left knee resting on the ground. He is thrusting his sword into the flank of a lion, at the same time in defense raising his left arm against the lion's head. The lion, having received a wound over his right foreleg, stands on his hind legs, clutching the sides of his enemy with his fore paws and burying his teeth in the man's left shoulder. Part of man's left foot and of lion's tail and left hind leg wanting. On right side of plinth (0.6 deep) traces of five Aramaic letters, left side broken off. Orig. in M. I. O., Constantinople. Pho. taken from a ca. (C. B. M. 9477).
XXVII	72	At least 4000 B.C.	Terra-cotta vase with rope pattern, in upright position as found in trench, an Arab on each side; h. 63.5, d. at the top 53. *Nippur* III, 5.49 m. below the E. foundation of Ur-Gur's Z.
XXVIII	73	At least 4000 B.C.	Arch of baked brick, laid in clay mortar, h. 71, span 51, rise 33. Bricks convex on one side, flat on the other. Front of arch opened to let light pass through. *Nippur* III, at the orifice of an open drain c. 7 m. below the E. corner of Ur-Gur's Z. View taken from inside the drain.
XXIX	74	Ur-Gur.	N. W. façade of the first stage of Ur-Gur's Z. A section of the drain which surrounded Z. is seen at the bottom of the trench. *Nippur* III.
XXX	75	1894 A.D.	General and distant view of the excavations at T., taken from an immense heap of excavated earth to the E. of Z. *Nippur* III.

CUNEIFORM TEXTS.

1



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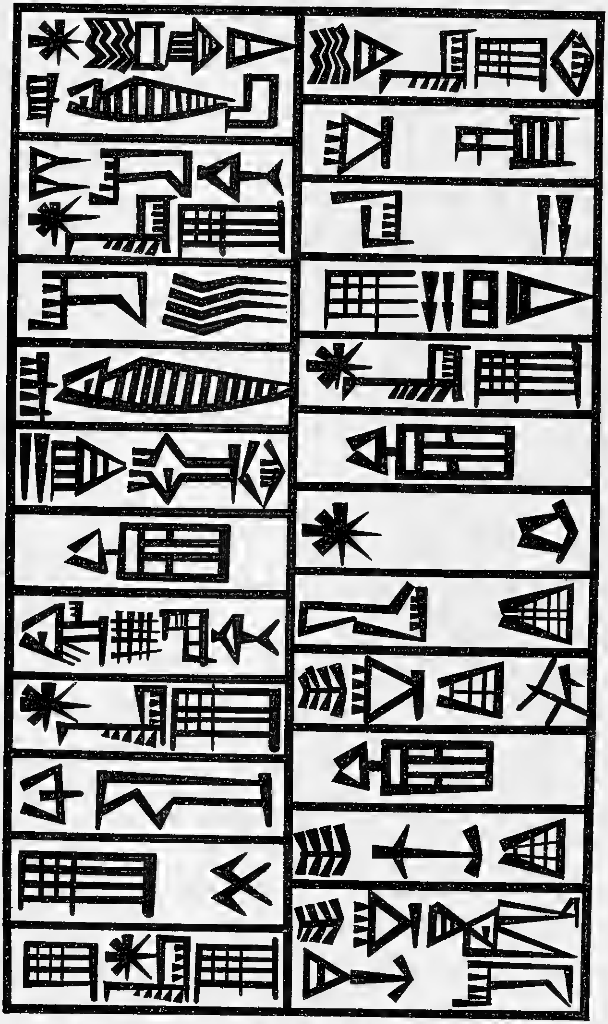

L. 15: ● *is omitted by the scribe.*

L. 17 and 21: The duplicate reads 

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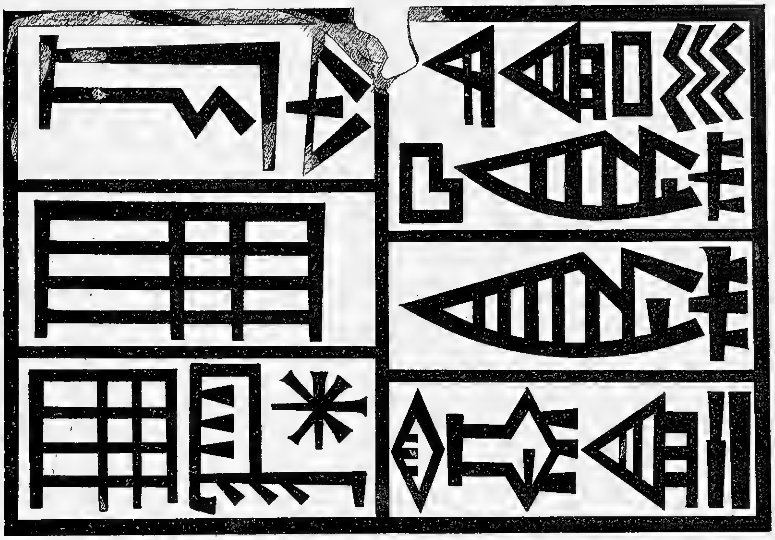

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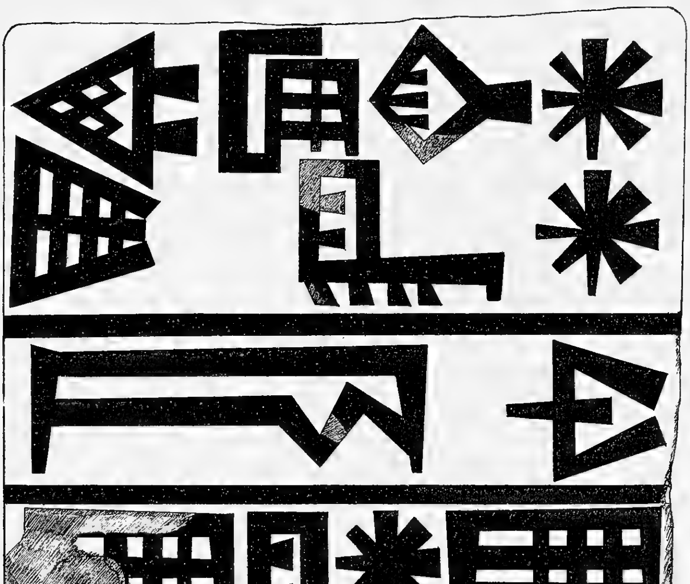

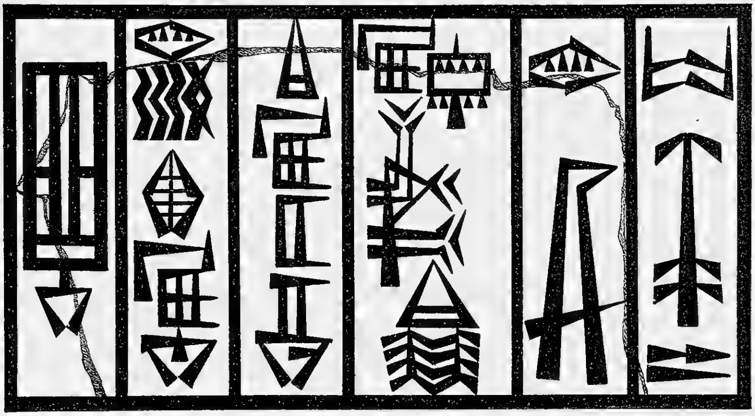

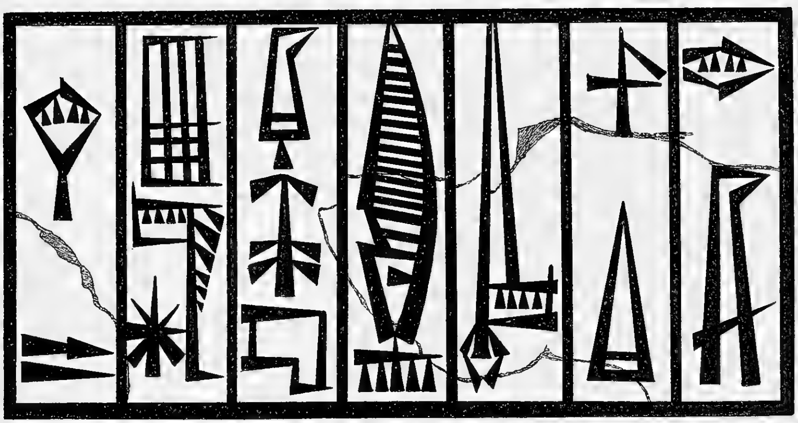

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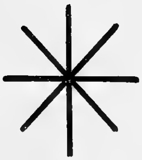

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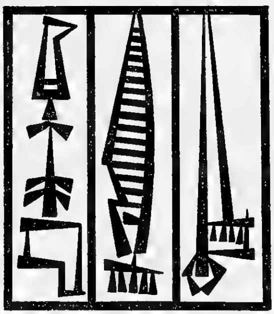

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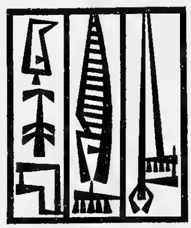

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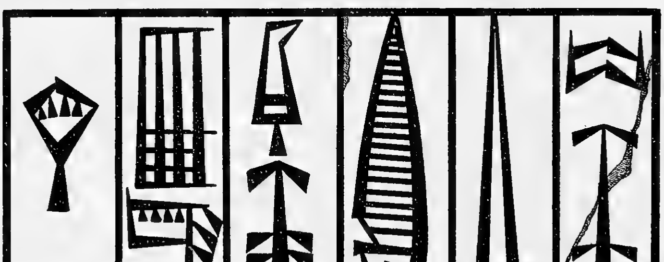

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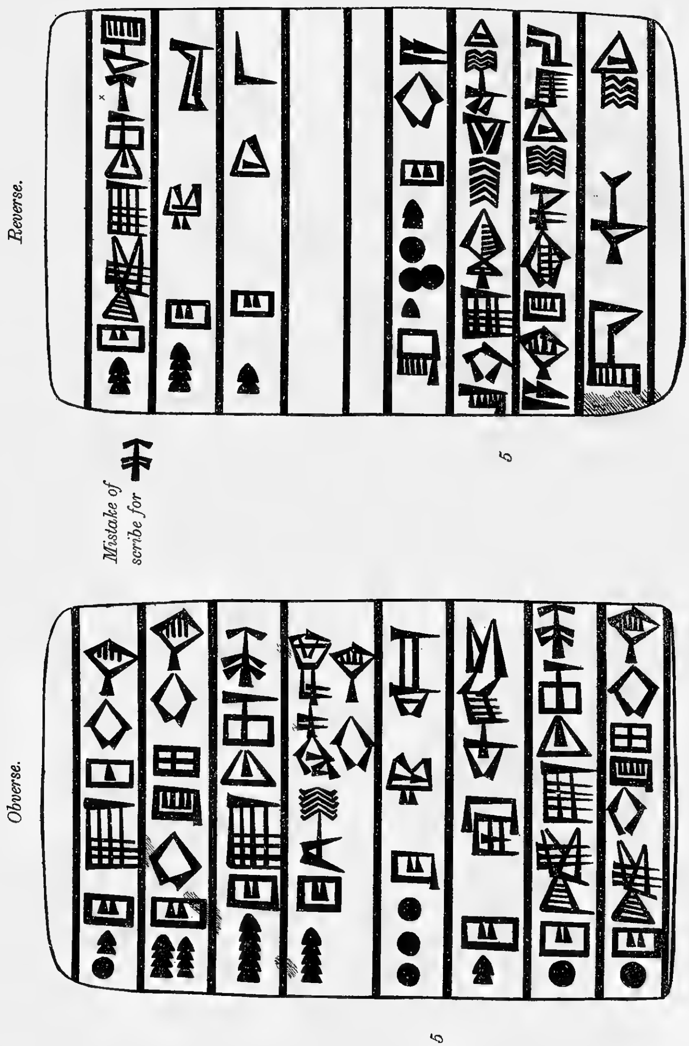
Reverse.
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11
Mistake of scribe for
Obverse.
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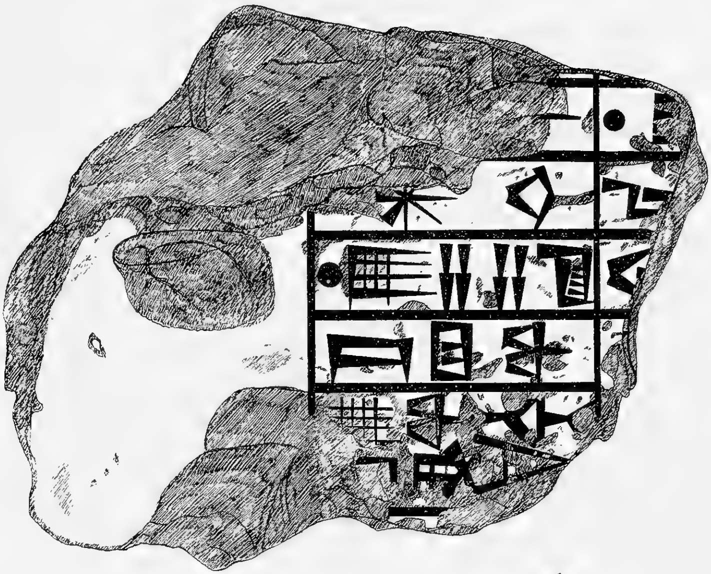

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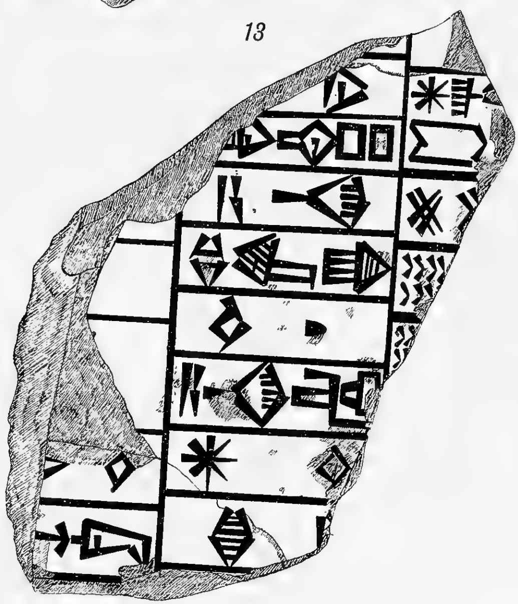

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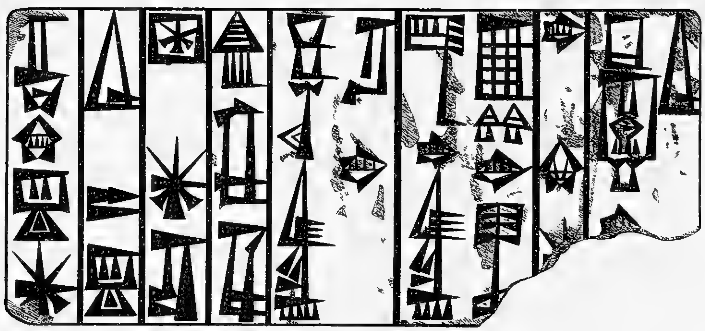

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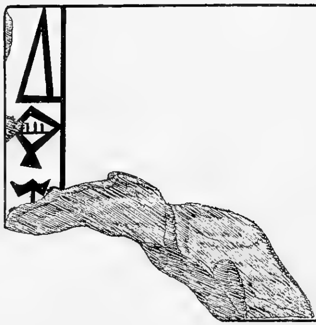

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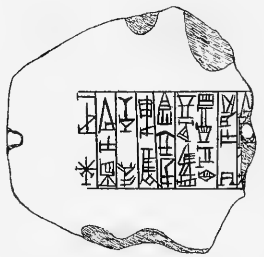
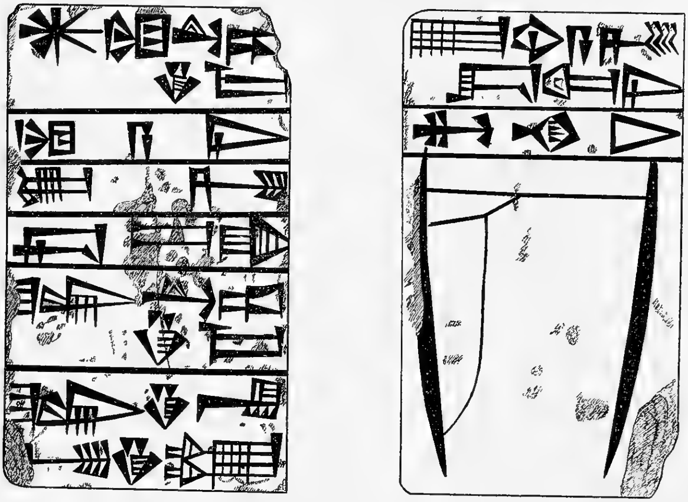


For Reverse see No. 43.

16

Obverse. Reverse.



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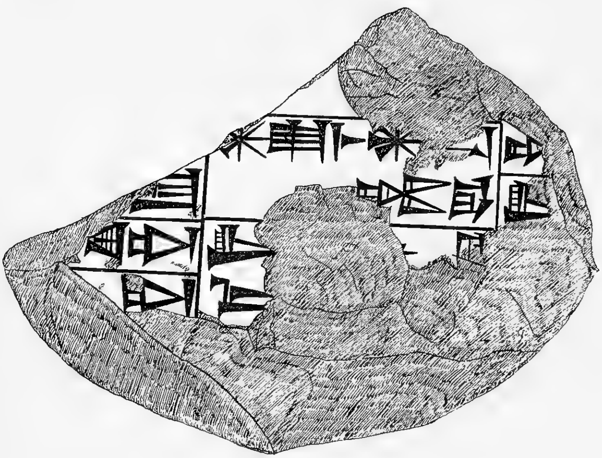

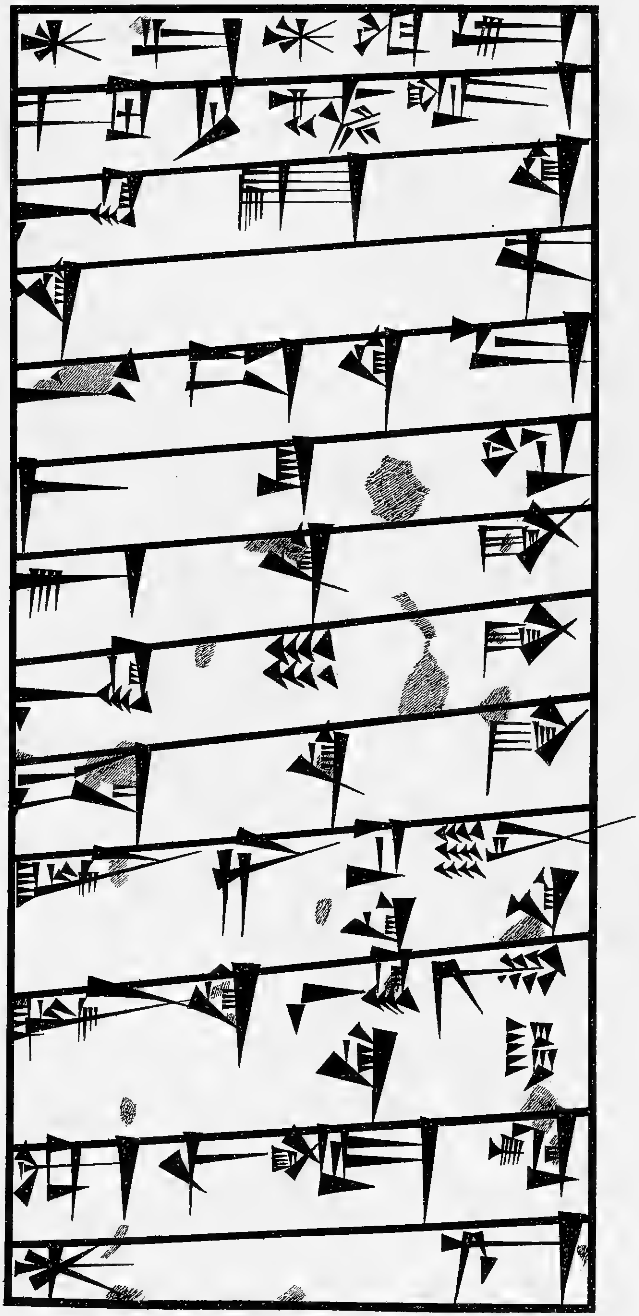

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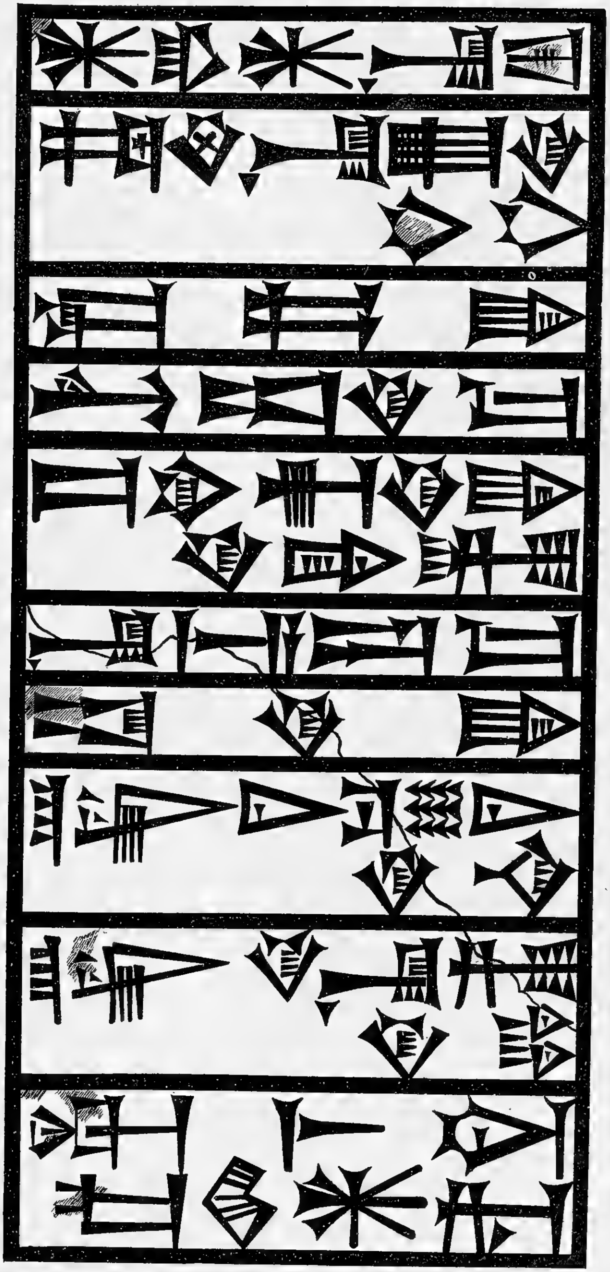

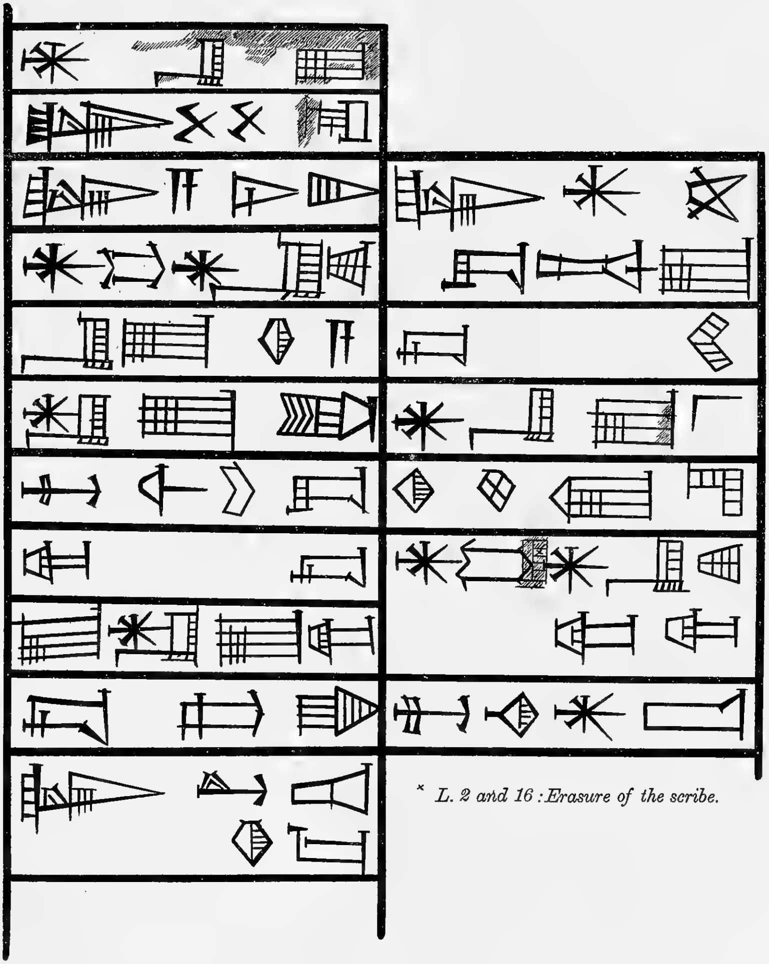

× L. 2 and 16 : Erasure of the scribe.

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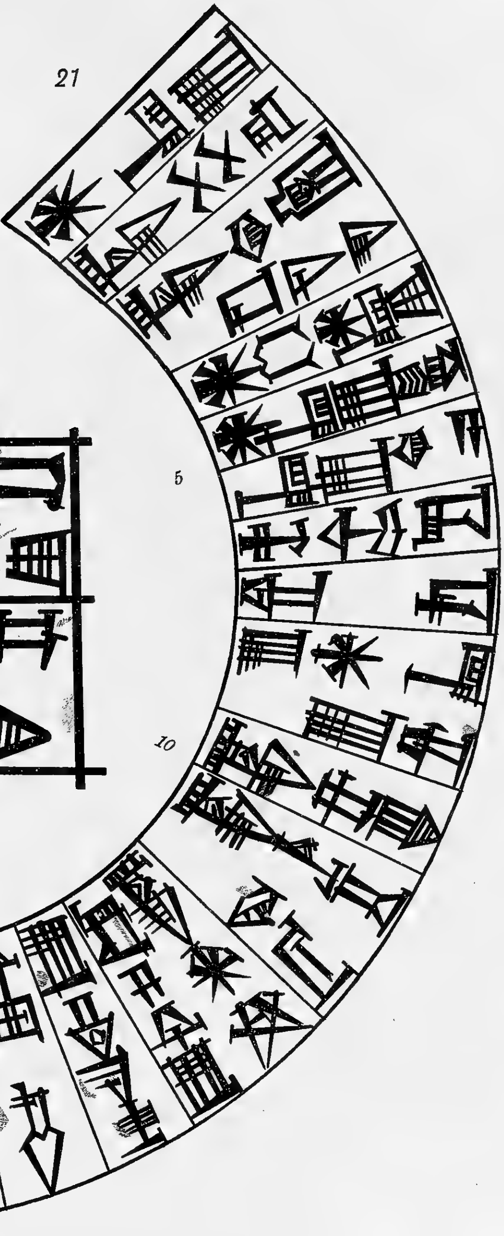

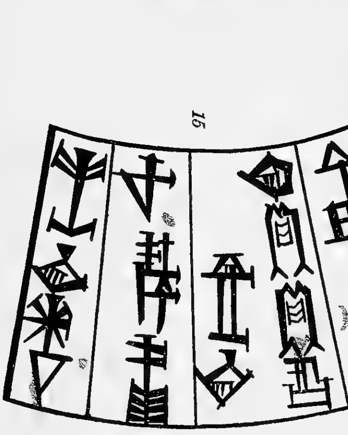

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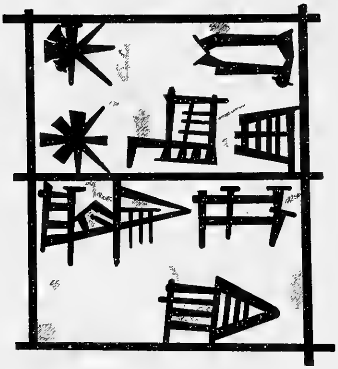

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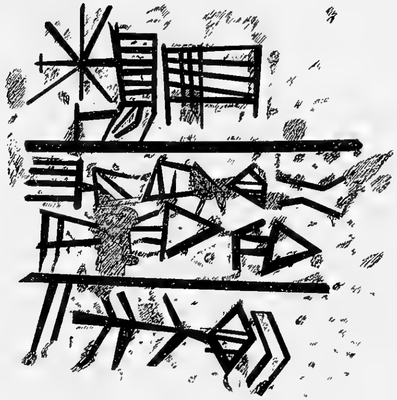

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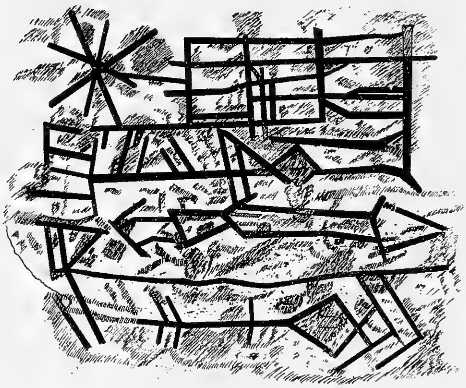

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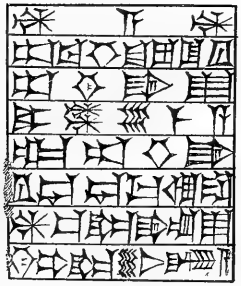

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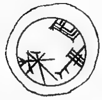

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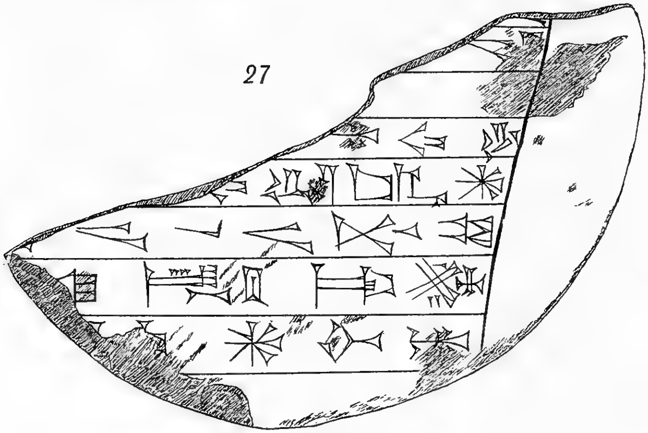

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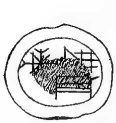

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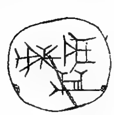

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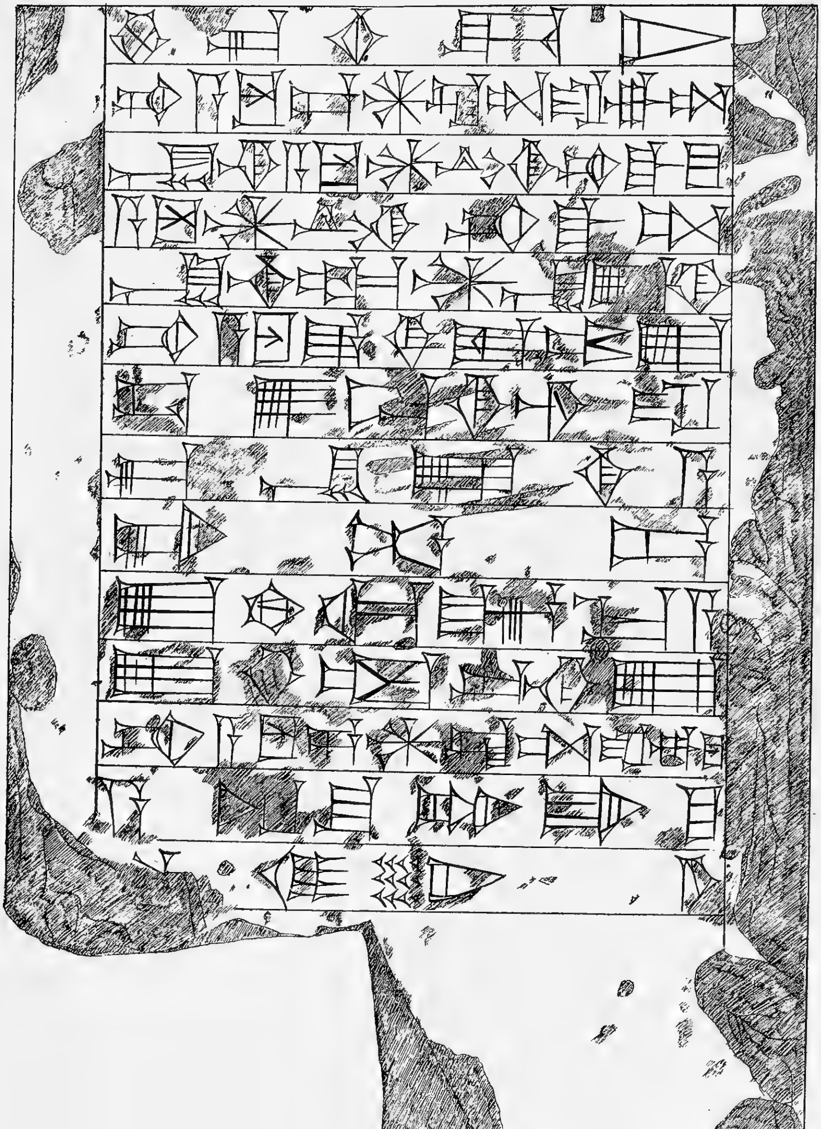

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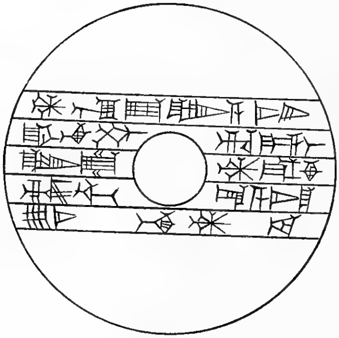

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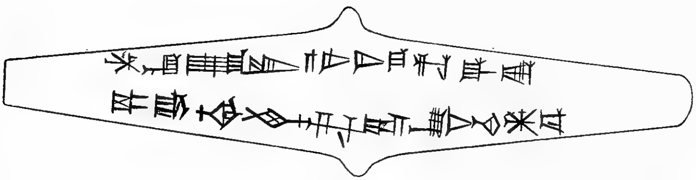

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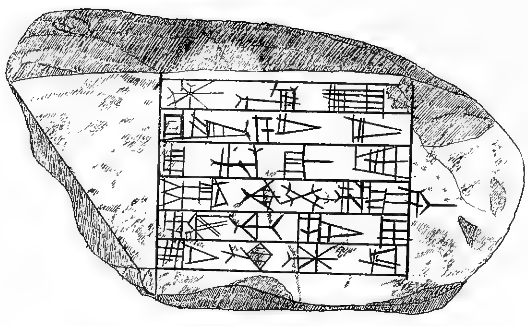

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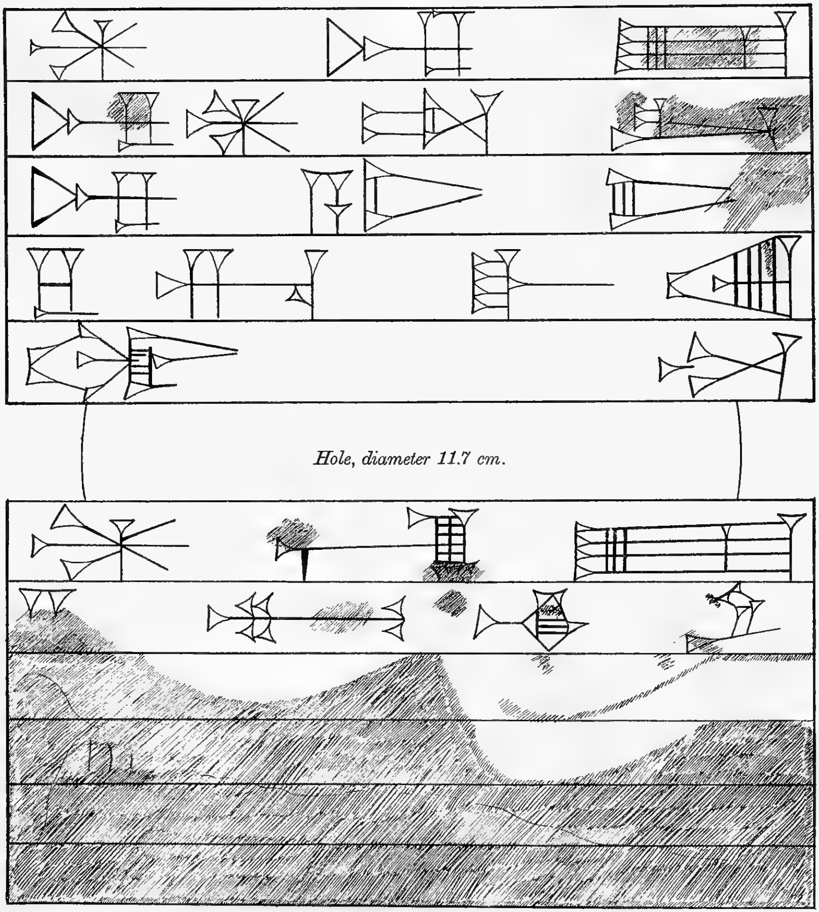
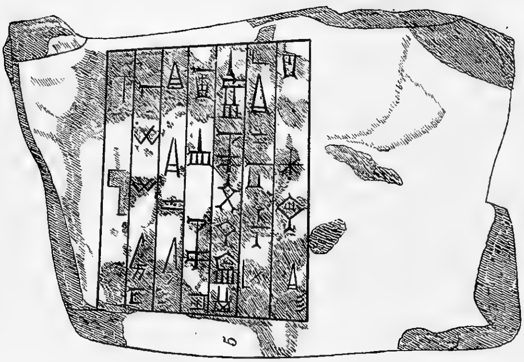
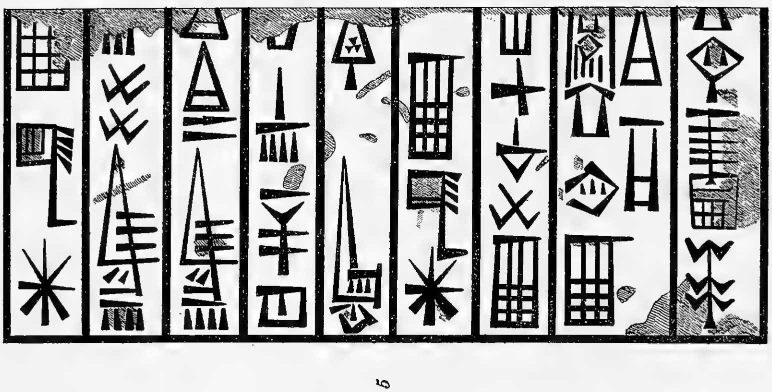


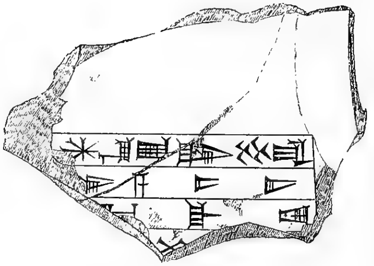
39



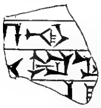
38



40



41



Cf. No. 46.

42

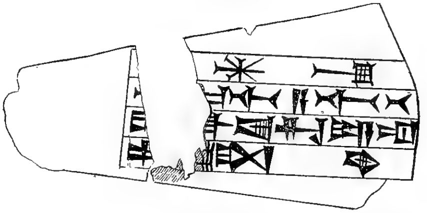
43

Reverse of No. 15.

44

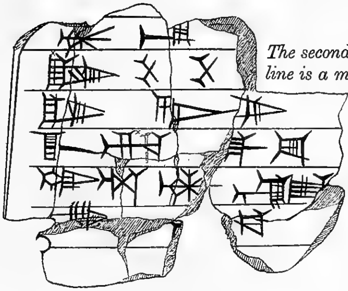
45

46



Cf. No. 41.

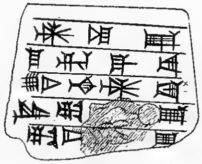
47



The second perpendicular line is a mistake of the scribe

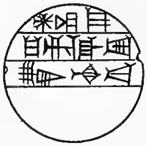
Erasure of the scribe

48

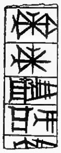


Mistake of scribe for

49

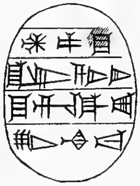


50

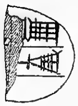


Cf. No. 74.

51

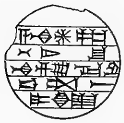


52

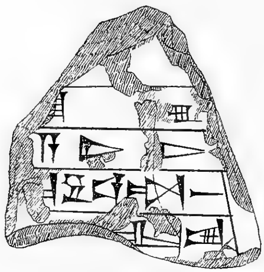


53

54



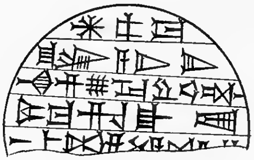
55



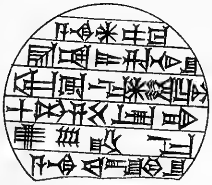
56

57

58



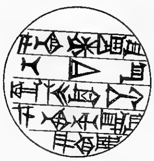
59



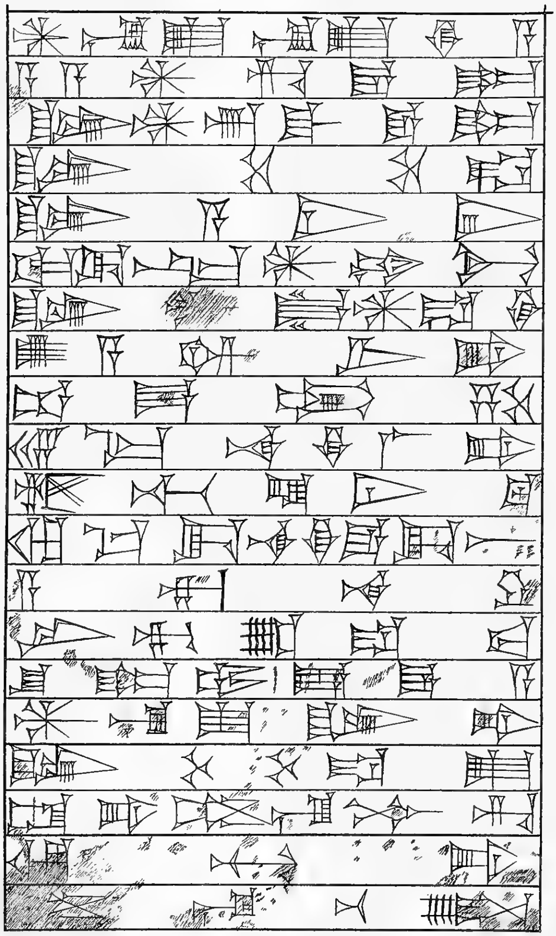
60

61

62

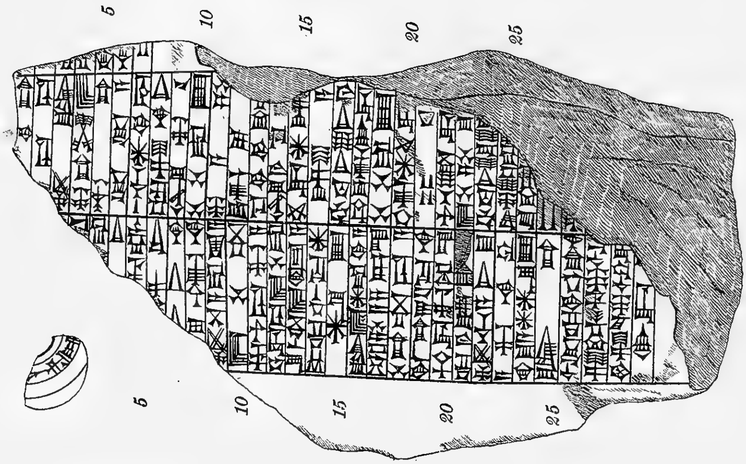


63



L. 7. Erasure of DINGIR, *the second character of* KA-DINGIR-RA, *written by the scribe erroneously before* KA.

68

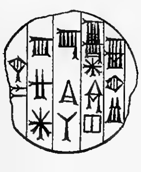


67

65

66

64



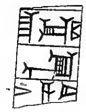
69

70

71

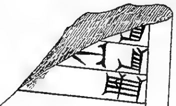
73

74

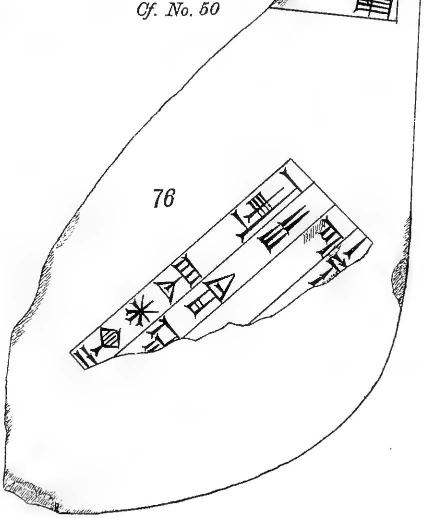


Cf. No. 50

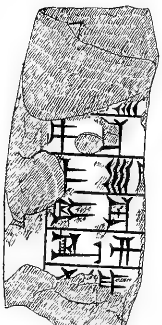
72



76

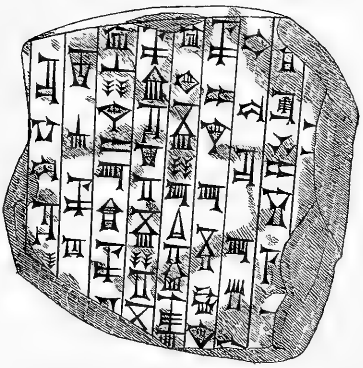


75



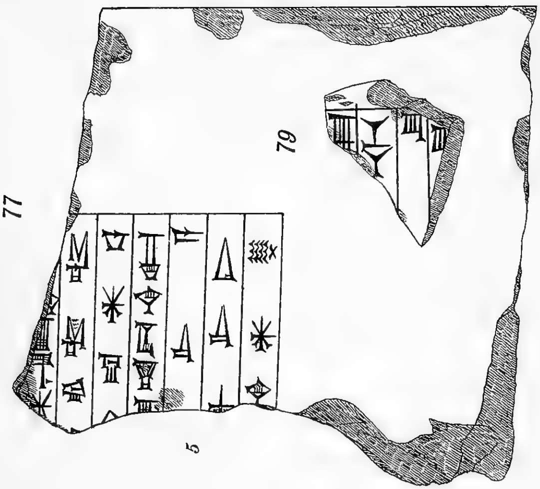
5

78



5

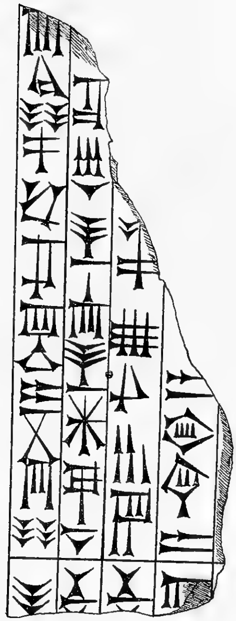
77



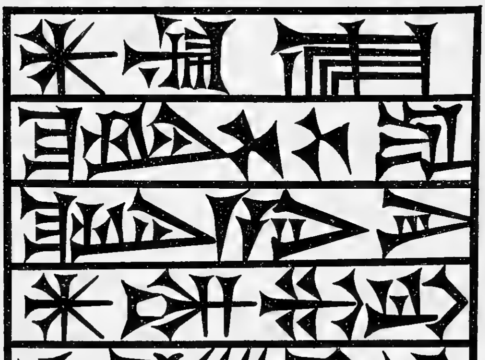
5

79

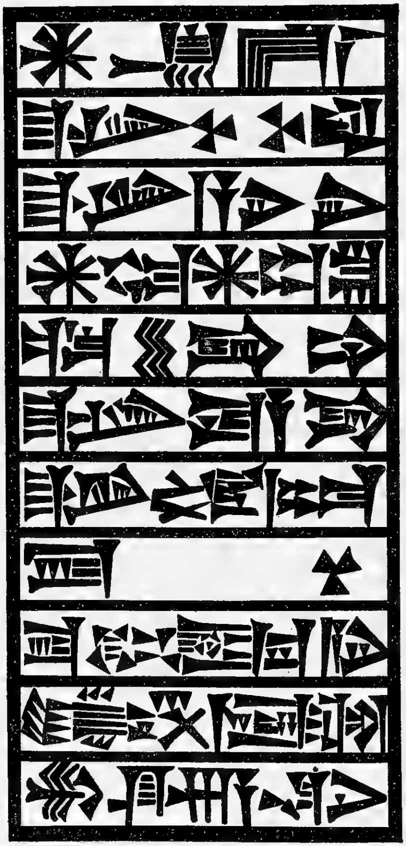
80



81

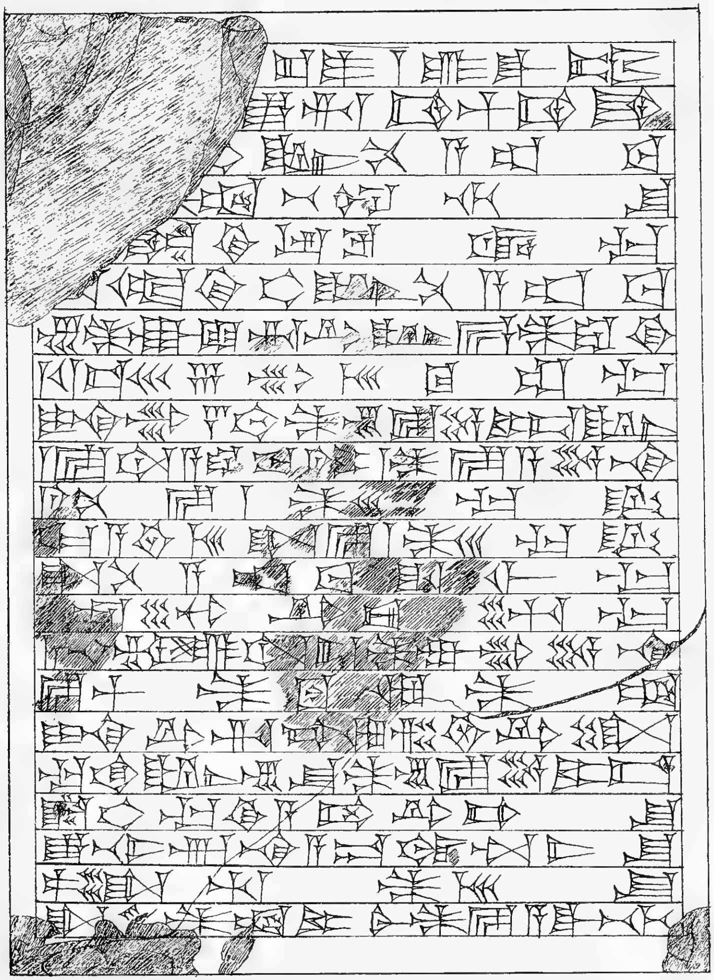


82



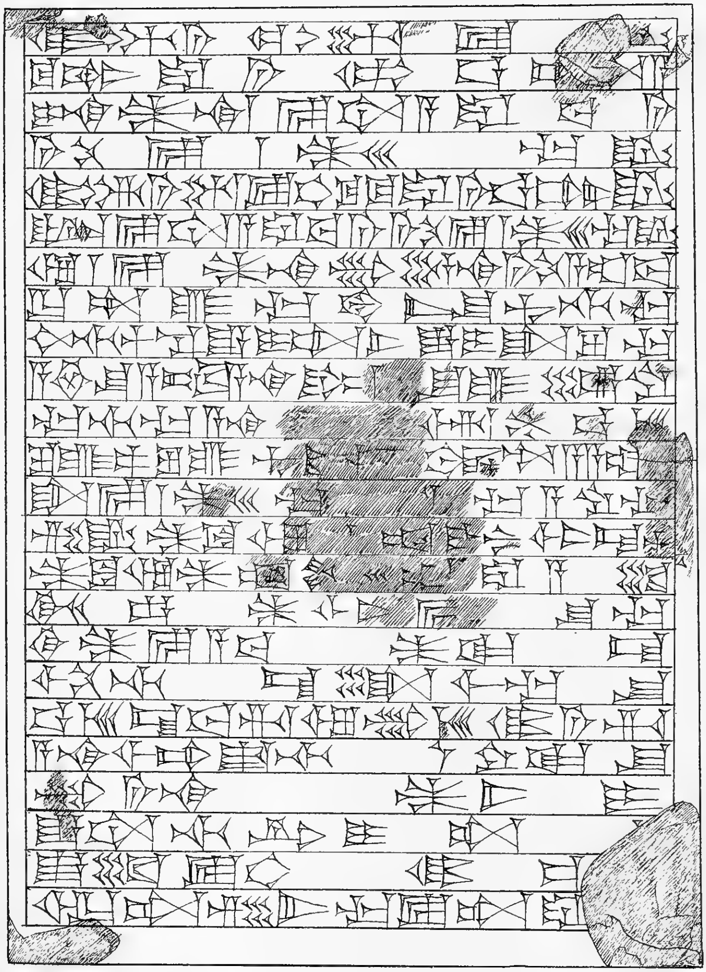
83

Obverse.



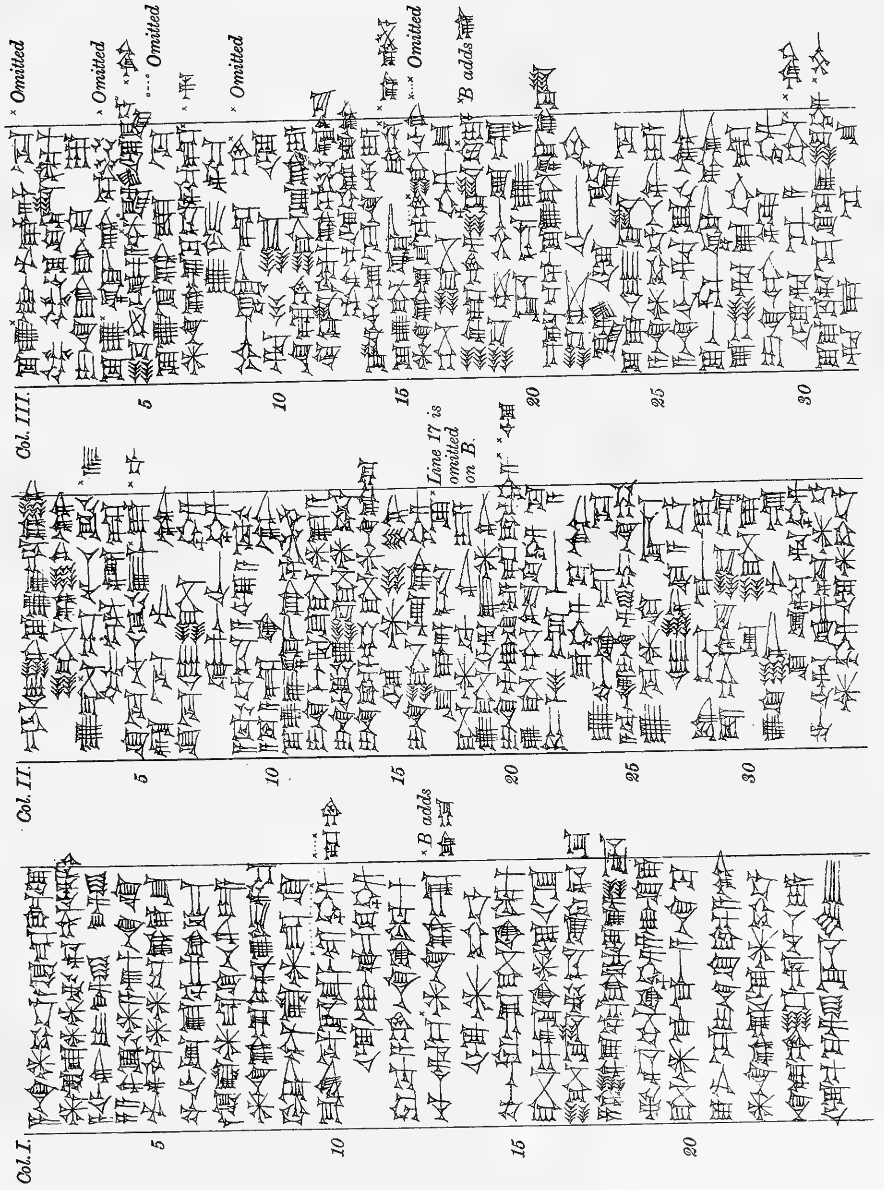
83

Reverse.



On the left margin of Reverse are traces of 

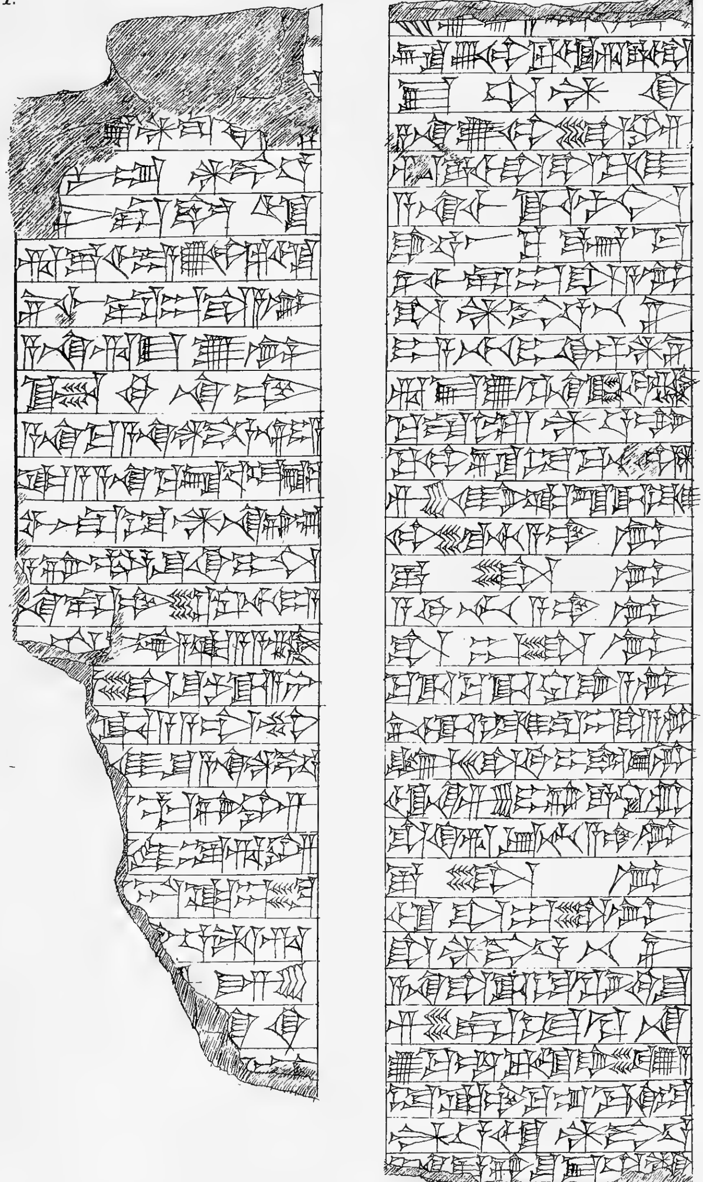
On the lower margin of Reverse is 


Col. I.
Col. II.
Col. III.
B adds
Line 17 is omitted on B.
Omitted
Omitted
Omitted
Omitted
Omitted
B adds

84
Continued

85

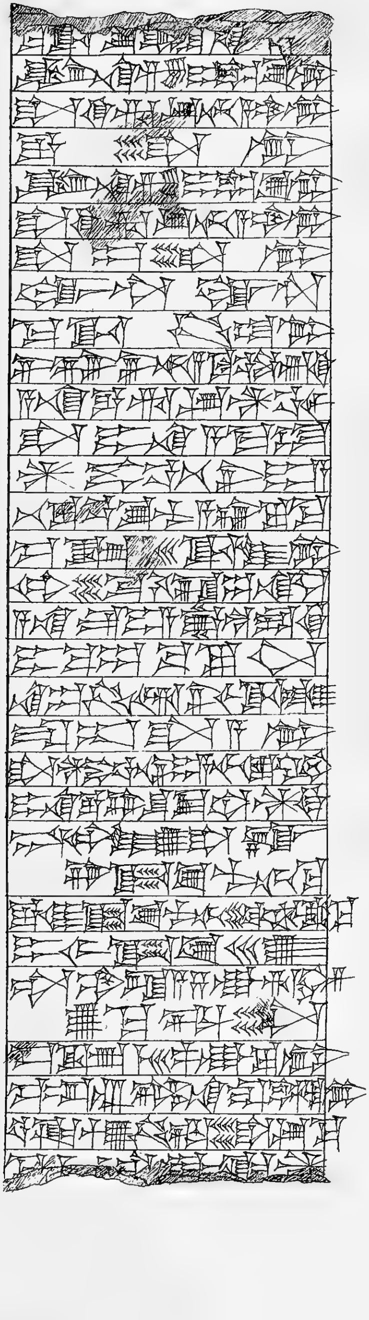
Col. I. Col. II.



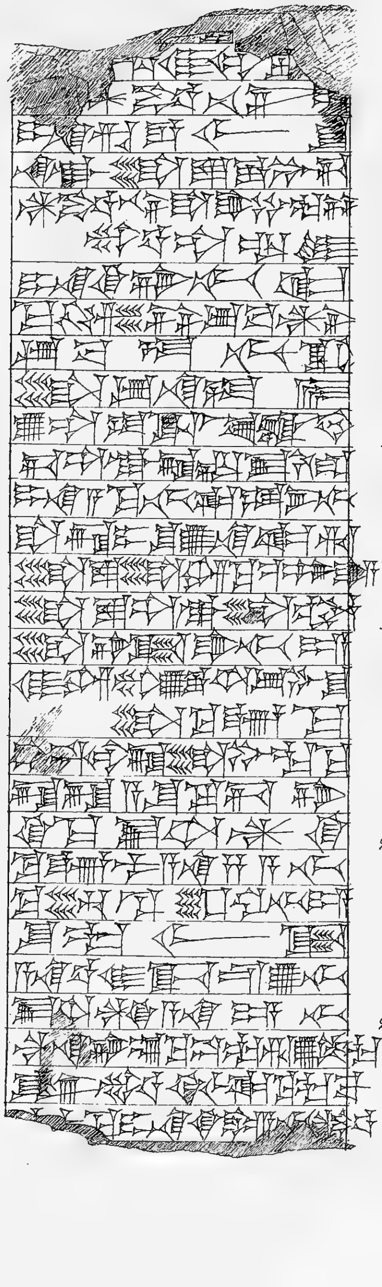
85

Continued

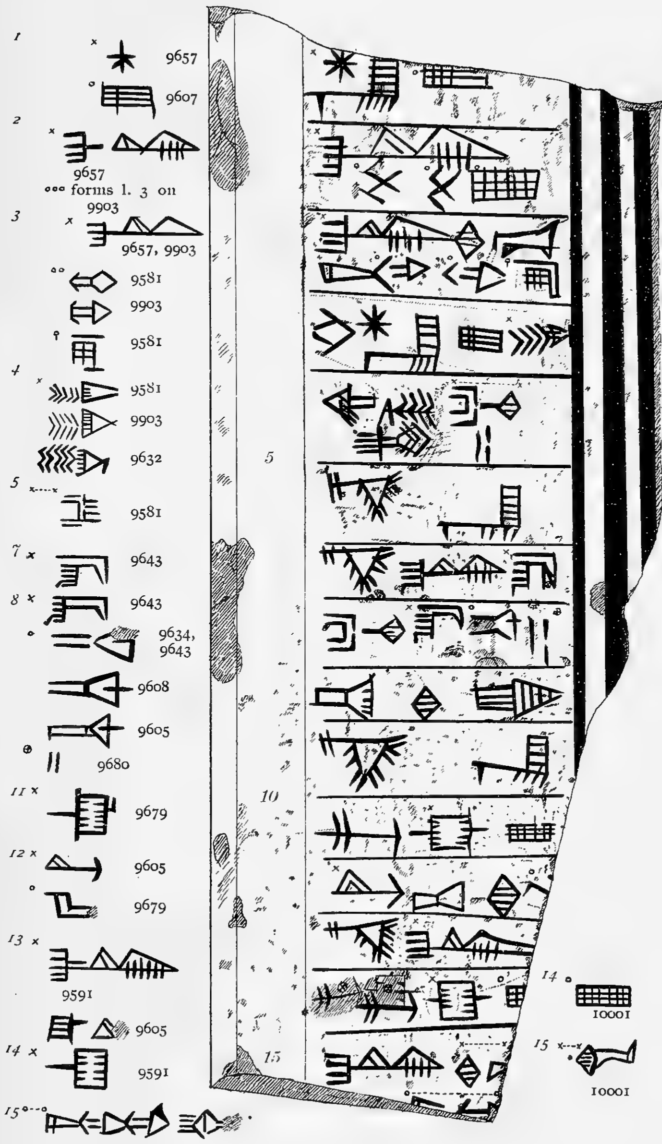
Col. III.



Col. IV.



86



l. 1: 9657+9607, 9581, 9901.

l. 2: ibid. (9903, 9902).

l. 3: 9657+9607+9609, 9581, 9903, (9901, 9902, 9632).

l. 4: 9609+9607, 9581, 9903, 9632, (9902, 9608).

l. 5: 9609+9607, 9581+9643, 9632, (9902, 9608, 9905).

l. 6: 9609+9607, 9643, 9608, (9905).

l. 7: 9609+9607, 9643, 9608, (9905, 9634).

l. 8: 9643, 9608, 9605, (9680, 9607).

l. 9: ibid., (9633, 9599, 9680, 9703).

l. 10: 9643, 9679, 9605, (9633, 9599, 9680, 9703).

l. 11: 9591+9679, 9605, (9633, 9599, 9680).

l. 12: ibid.

l. 13: 9591, 9605, 10001, (9633).

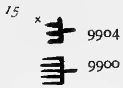
l. 14: 9591, 10001, (9605, 9633, 9904).

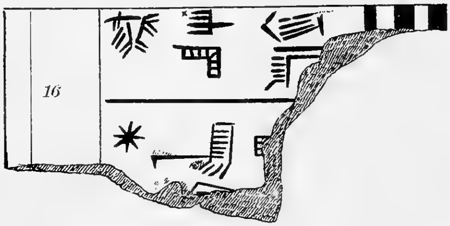
l. 15: 10001, 9591, 9904, (9633)

Note: ⊙*L. 7: The scribe forgot to erase two lines drawn by mistake.*
L. 14: Erasure of MU-AG.

86

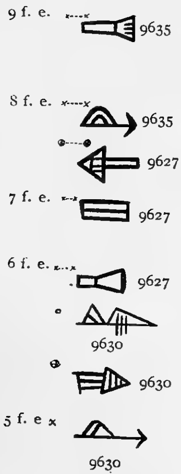
Continued

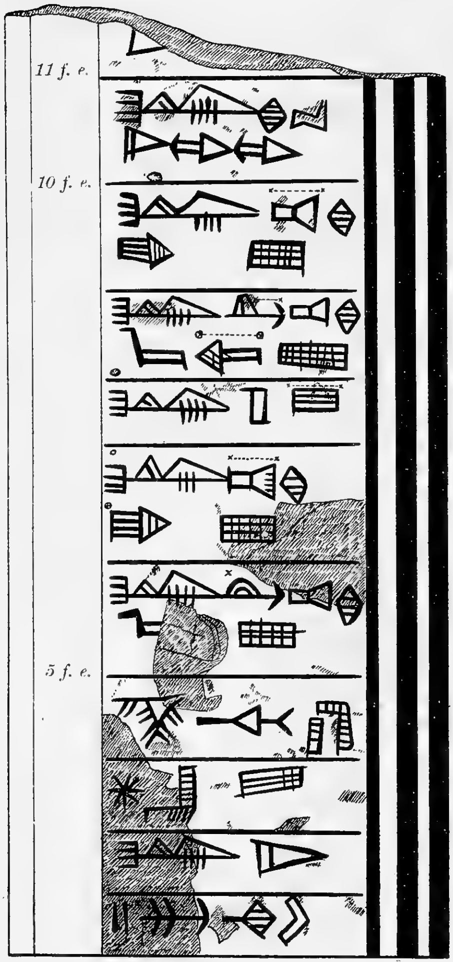




l. 16-17: 10001; for l. 16 cf. also 9900, 9904.

Several lines wanting.





l. 11 f. e.: 9635.

10 f. e.: 9635+9620.

9 f. e. 9620, (9635).

8 f. e.: 9620+9627 +9635+9606.

7 f. e. 9606, 9627, (9604).

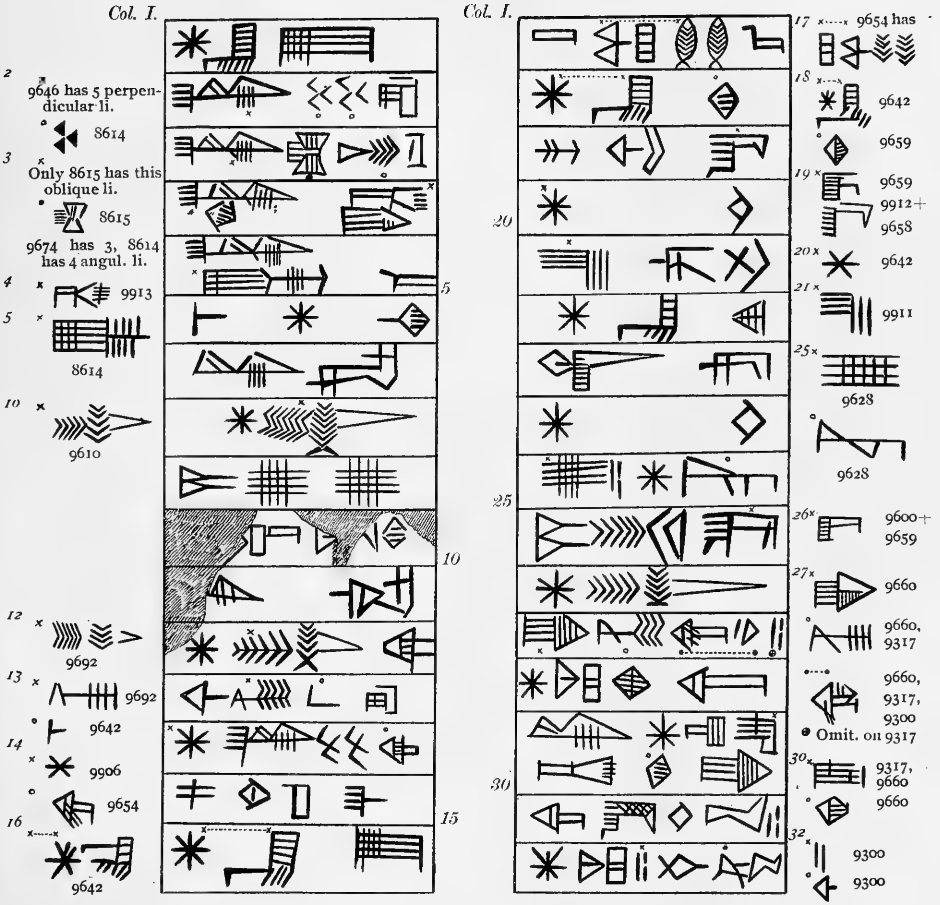
6 f. e.: 9606. 9630, 9627, (9604).

5 f. e.: 9604, (9630, 9631, 9606, 9917 9639).

4-1 f. e.: 9604, beginn. of l. 3-1 restor. from 9644, for l. 4 cf. (9631, 9639, 9634, 9917).

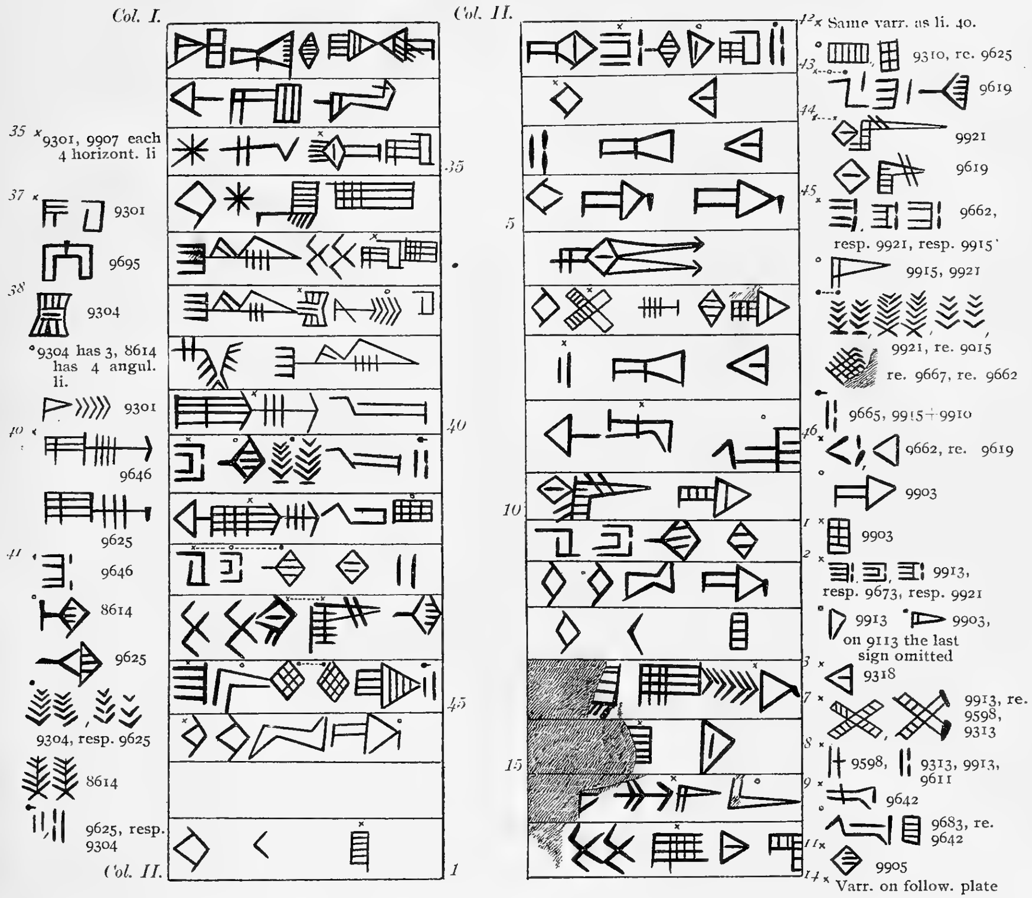
2 f. e.: (9917, 9639).

1 f. e.: (9607).



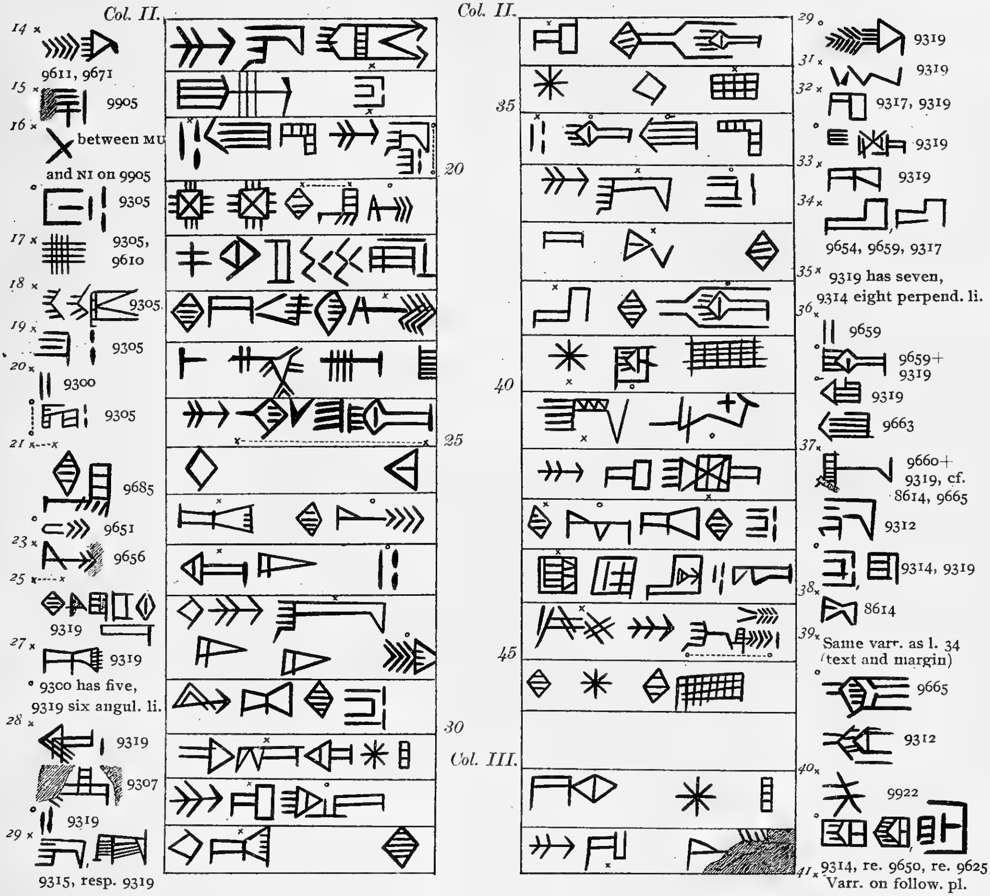
NOTE.—The above text has been restored from the following fragments, **Col. I, L. 1:** frr. 8614, 9646, (9313, 9915, 9611, 9923). **L. 2:** 8614, 8615, 9646, 9921+9313, 9115+9913, 9611, (9674, 9923). **L. 3:** 8614, 8615, 9913, 9674, 9662, (9313). **L. 4:** 8614,8615, 9674, 9913, 9662, (9587). **L. 5:** 8614, 8615, 9674, 9913, (9662, 9587). **L. 6:** 8615, 9610, (9913, 9674, 9587). **L. 7:** 8615, 9610, (9587). **L. 8-9:** Ibidem. **L. 10:** (9692, 9642). **L. 11:** 9696, (9692, 9642, 9689). **L. 12:** 9696+9637, 9642, 9692, (9689). **L. 13:** 9642, 9637, 9689, 9583, (9692, 9654, 9906). **L. 14:** 9642, 9654, (9689, 9583, 9906, 9637). **L. 15:** 9642, 9654, 9318, 9583, 9906, (9689, 9656). **L. 16:** 9642, 9318, 9654, 9906, (9583, 9689, 9656, 9659+9319). **L. 17:** 9318, 9642, 9654, 9906, (9912+9658, 9583, 9659 + 9319). **L. 18:** 9318, 9642, [written on L. 17], 9906, (9912+9658, 9654, 9659). **L. 19:** 9318, 9642, (9317, 9651, 9912+9658, 9702, 9659, 9906). **L. 20:** 9317, 9318, 9651, (9642, 9702, 9906). **L. 21:** 9317, 9911+9651, 9645, (9659). **L. 22:** 9317, 9911, 9645, (9659, 9700). **L. 23:** 9317, 9645, 9659, (9628, 9700). **L. 24:** 9317, 9645, 9628, 9659. **L. 25:** 9317, 9645, 9628, 9659+9660. **L. 26:** 9317, 9660+9659, (9584, 9645, 9300, 9301). **L. 27:** 9317, 9660, 9584+9315, 9301, (9300). **L. 28:** 9584+9315, 9660, 9317, 9301, (9300). **L. 29:** 9584+9315, 9317, 9301, 9660, (9300, 9307). **L. 30:** 9584+9315, 9301, 9317, 9660, 9307, 9300. **L. 31:** 9301, 9584+9315, 9660, 9307, 9300. **L. 32:** 9301, 9300, (9307, 9315, 9907).

87
Continued



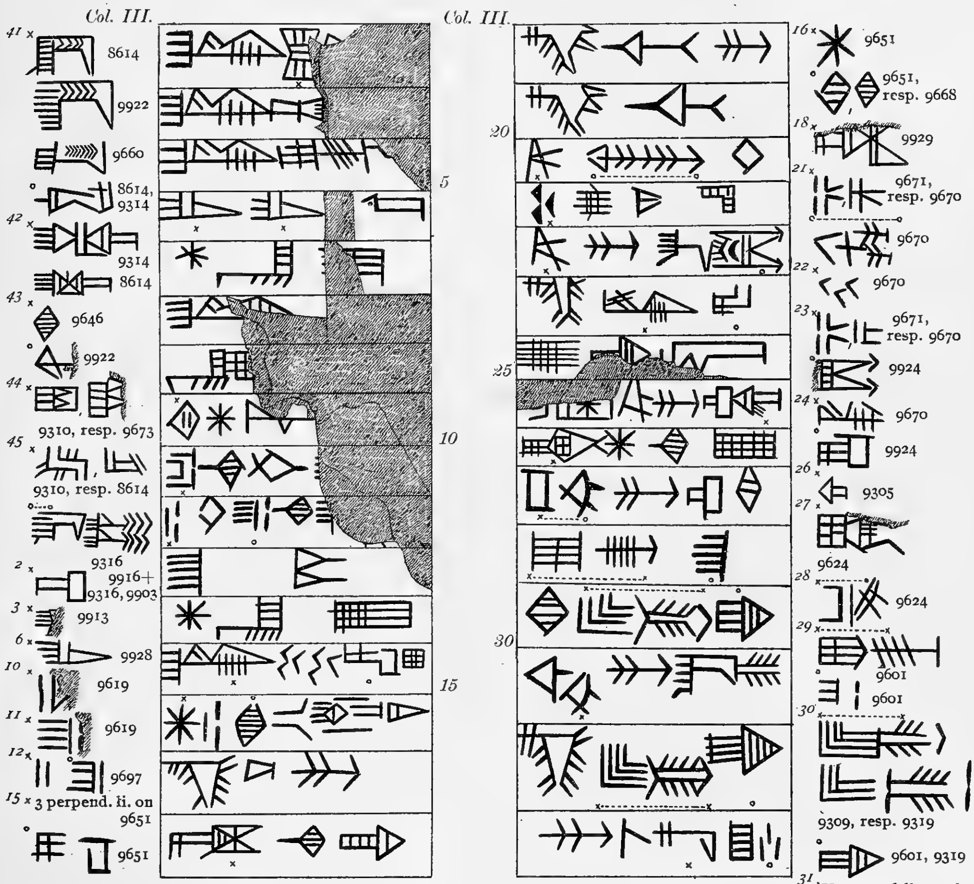
L. 33: 9907, 9301, 8614, 9300, (9306). **L. 34:** 9301, 8614, 9907, (9306). **L. 35:** 9301, 8614, 9907, 9306. **L. 36:** 9301, 8614 [col. II begins], 9306, (9907, 9695). **L. 37:** 8614, 9301, 9306, (9695, 9304). **L. 38:** 8614, 9301, 9304, 9306, (9695, 9646). **L. 39:** 8614, 9304, 9646, 9625, 9306, (9595, 9695, 9638). **L. 40:** 8614, 9304, 9646, 9625, 9638, 9306, (9695, 9914). **L. 41:** 8614, 9304, 9646 [col. I ends], 9625, 9306, (9914, 9638, 9695). **L. 42:** 9304, 8614, 9619, 9625, 9306 [col. I ends], 9310 [col. II begins], (9914, 9921). **L. 43:** 9619, 9304, 9662, 9701, (9921, 9914+9910, 9310). **L. 44:** 9619, 9662+9665, 9915+9910, 9921, 9701, (9922). **L. 45:** 9619, 9915+9910, 9662+9665, 9921, (9667, 9922). **L. 46:** 9921, 9619, 9915, 9667, (9908, 9665, 9922, 9318, 9662). **Col. II, L. 1:** 9913, 9921, 9667, 9903, (9318, 9662). **L. 2:** 9921+9313, 9667, 9913, 9903, 9673, (9318). **L. 3:** 9921, 9667, 9913, 9903, 9673, 9658, (9318). **L. 4:** 9913, 9313 [col. II begins], 9658, 9903, 9673, (9667). **L. 5:** 9913, 9313, 9658, 9903, (9673, 9667). **L. 6:** 9913, 9313, 9658, 9642, (9903, 9645). **L. 7:** 9313, 9642, (9611, 9913, 9598). **L. 8:** 9313, 9611, 9642, (9598, 9913, 9683). **L. 9:** 9611 [col. II begins], 9642, 9905, (9683, 9598, 9313). **L. 10:** 9611, 9642, (9683, 9905, 9598, 8615, 9674). **L. 11:** 9611, 9642, 9683, (9905, 9674, 8615). **L. 12:** 9611, 9642, (9905, 9683, 9674, 8615). **L. 13:** 9611, 9687, (9642, 9674, 9683, 9905). **L. 14:** 9905, 9687, (9611, 9671). **L. 15:** 9305 [col. II begins], (9905, 9671, 9687, 9624). **L. 16:** 9305, 9624, (9671, 9905). **L. 17:** 9624, 9610, 9305, (9300).

87
Continued



L. 18: 9610, 9624, 9300, 9305, (9668). **L. 19:** 9610, 9300 [includes the first three characters of L. 20], 9305, (9624). **L. 20:** 9610, 9300, 9305, (9651, 9308, 9685, 9668). **L. 21:** 9610, 9651, 9300, 9685, (9305, 9668, 9308). **L. 22:** 9300, 9651, 9610, 9656, (9319, 9305, 9308). **L. 23:** 9300, 9319, 9656, (9651, 9610). **L. 24:** 9300, 9319, 9656, 9925). **L. 25:** 9300, 9319, (9309, 9315, 9925). **L. 26:** 9300, 9319, 9315, (9309, 9925). **L. 27:** 9319, 9300, 9315, (9309, 9925). **L. 28:** 9319, 9315, (9307, 9309, 9300, 9317). **L. 29:** 9319, 9307, 9315, (9317, 9309). **L. 30:** 9319, 9307, (9315, 9317, 9309). **L. 31:** 9659+9319, 9307, (9317, 9315, 9309, 9654). **L. 32:** 9307, 9659+9319, 9317, 9654. **L. 33:** 9307, 9659+9319, 9654, 9317, (9907, 9314). **L. 34:** 9307, 9659+9319, 9654, 9907, (9317, 9314). **L. 35:** 9307, 9659+9319, 9654, 9907, 9314, (9317, 9663). **L. 36:** 9659+9319, 9307, 8614, 9654, 9907, 9314, (9663, 9317). **L. 37:** 9307, 9660+9659+9319, 8614, 9665, 9314, 9312, (9654, 9663). **L. 38:** 9307, 8614, 9660+9319, 9665, 9314, 9312, (9914, 9663, 9667). **L. 39:** 8614, 9665, 9307, 9660+9319, 9914, 9314, 9312, (9922, 9667, 9625). **L. 40:** 8614 [col. III begins], 9665, 9914, 9307, 9625, 9660, 9314, (9922, 9667). **L. 41:** 9914, 8614, 9660, 9665, 9314, (9625, 9922, 9307). **L. 42:** 9914+9320, 8614, 9314+9316, (9660, 9665, 9922). **L. 43:** 9914+9320, 8614, 9314+9316, (9646+x+9310, 9922, 9673). **L. 44:** 9910+9914+9320, 8614, 9314+9316, (9310 [col. III begins], 9673, 9922). **L. 45:** 9915+9910+9320, 8614, 9316, (9310). **L. 46:** 9915+9910+9320, 8614, 9316, (9310, 9928). **Col. III, L. 1:** 9913+9320, 9928, 9316, (9903, 8614). **L. 2:** 9913+9320, 9903, 9916+9316, (9928).

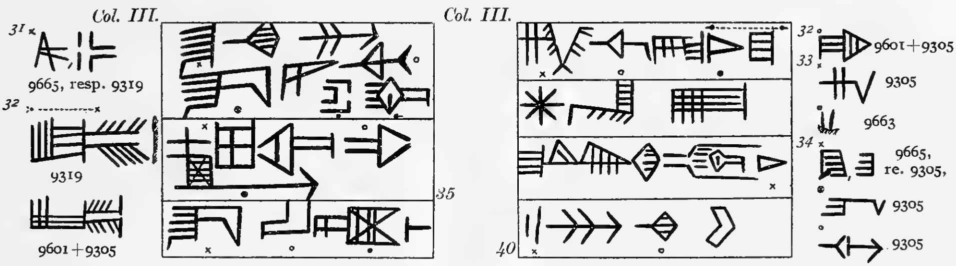
87
Continued



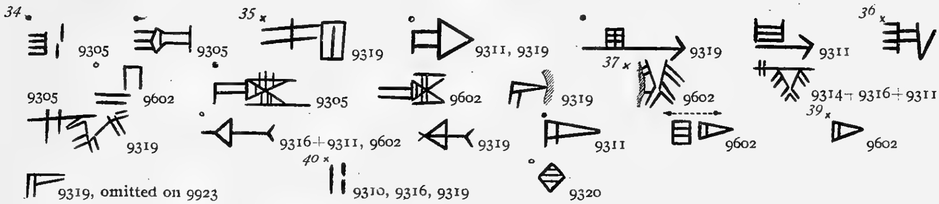
'Varr. on follow. pl.

L. 3: 9916+9316, 9903, (9913, 9928). **L. 4:** 9903, 9913, (9928, 9926, 9916). **L. 5:** 9903, 9926, (9928, 9913, 9304). **L. 6:** 9903, 9928, (9926, 9913, 9304). **L. 7:** 9903, (9928, 9304, 9926). **L. 8:** (9304, 9903, 9928). **L. 9:** (9304, 9619). **L. 10:** 9304, (9308, 9619, 9313). **L. 11:** 9308, (9697, 9619, 9313). **L. 12:** 9308, 9697, (9313, 9619). **L. 13:** 9308. **L. 14:** 9308. **L. 15:** 9308, 9651, (9668). **L. 16:** 9308, 9651, (9698). **L. 17:** 9308, (9668, 9924). **L. 18:** 9308, (9929, 9927, 9668, 9924). **L. 19:** 9308, 9929, (9666, 9927, 9924). **L. 20:** 9666, 9929, 9308, (9927, 9924). **L. 21:** 9666, 9670, (9924, 9927, 9671, 9929). **L. 22:** 9666, 9670, (9671, 9924). **L. 23:** 9666, 9670, (9671, 9924). **L. 24:** 9666, 9670, (9671, 9924). **L. 25:** (9666, 9671, 9670, 9305, 9924). **L. 26:** 9305, (9309+9924, 9624). **L. 27:** 9309+9924, 9305 [col. II ends], (9624, 9610). **L. 28:** 9601, 9309+x+9924, 9624, (9663, 9319, 9638, 9610). **L. 29:** 9319, 9309+x+9924, 9601, 9663, (9665, 9624). **L. 30:** 9601, 9663, 9319, 9309, (9665). **L. 31:** 9601, 9663, 9319, 9309, (9665, 9312, 9307). **L. 32:** 9601+9305, 9663, 9319, (9309+9311, 9665, 9312, 9307). **L. 33:** 9305, 9319, 9309+9311, (9665, 9907, 9663).

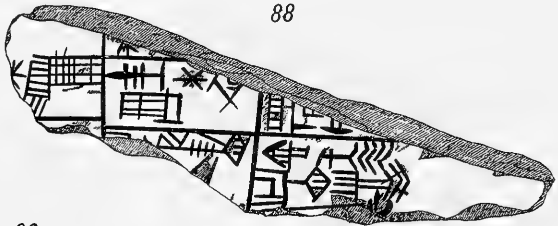
87
Continued



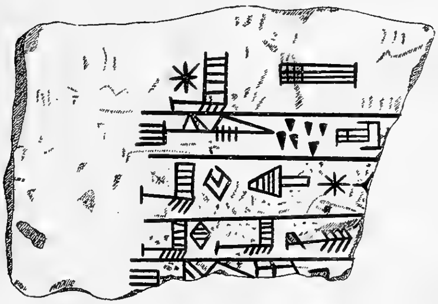
Variants continued.



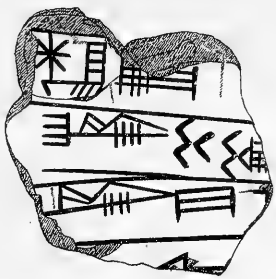
88



90

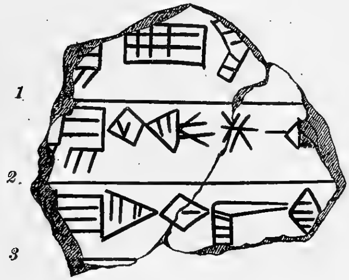


89



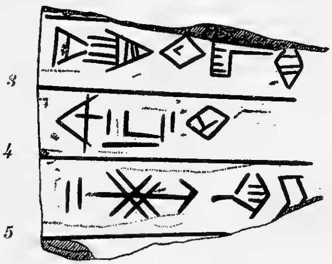
L. 34: 9305, 9319, 9311, (9665, 9307, 8614). **L. 35:** 9305, 9319, 9316+9311, 8614 [col. III ends], (9602, 9307.) **L. 36:** 9305, 9314+9316+9311, 9319, 9602, (9307). **L. 37:** 9305, 9602, 9314+9316+9311, 9319, (9310, 9307). **L. 38:** 9305, 9602, 9319. 9310, 9314+9316+9311+9923. **L. 39:** 9305, 9602, 9316+9923, 9319, 9310, (9320). **L. 40:** 9305, 9316+9923, 9602, 9310, 9320, 9319.

91



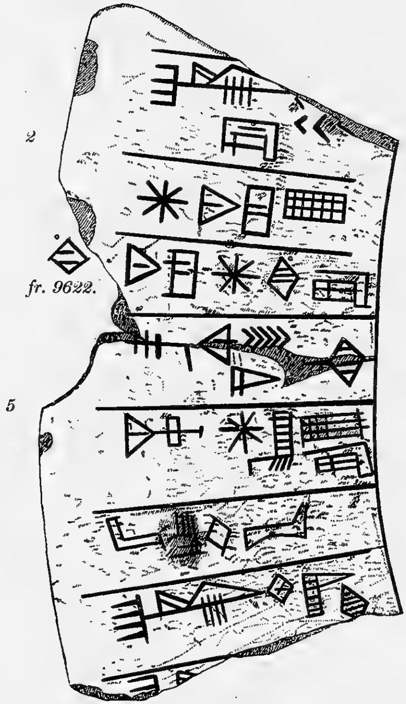
Cf. No. 92.

92

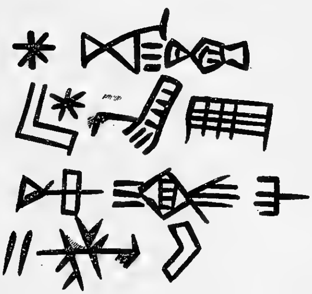


Numbering of lines on the basis of No. 91.

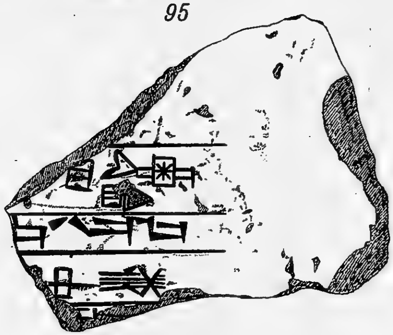
93



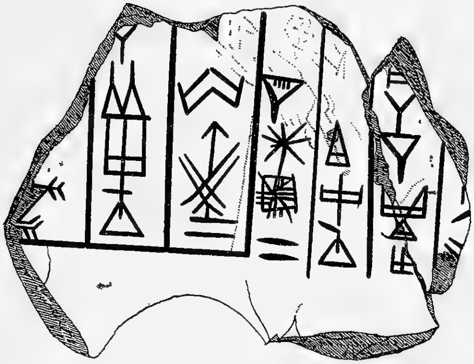
94



95

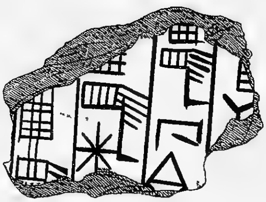


98

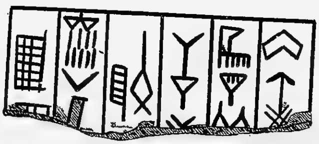


101

97

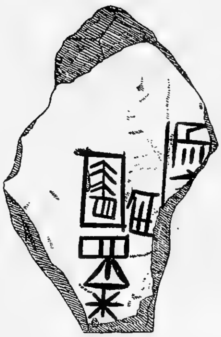


99

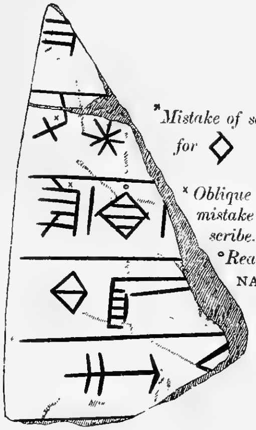


96

100



103



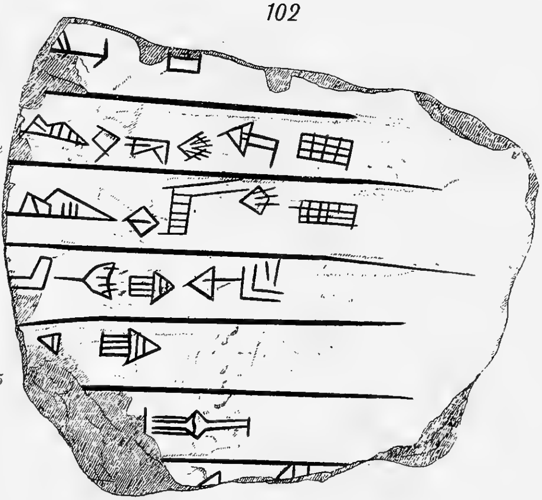
*Mistake of scribe for ◇

× Oblique lii. mistake of scribe.

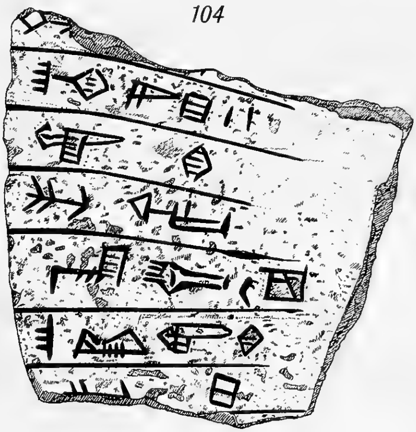
°Read NA.

After a break of several lines Pl. 46 No. 110 follows. Cf. Nos. 104 and 105.

102



104



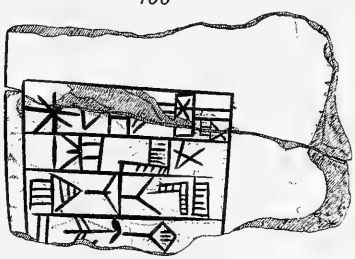
Numbering of lines on the basis of No. 103. Cf. No. 105.

105

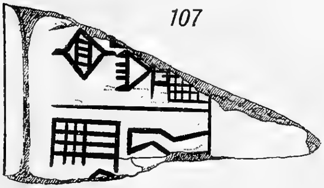
× *Erasure of scribe.*

Numbering of lines on the basis of Nos. 103 and 104.

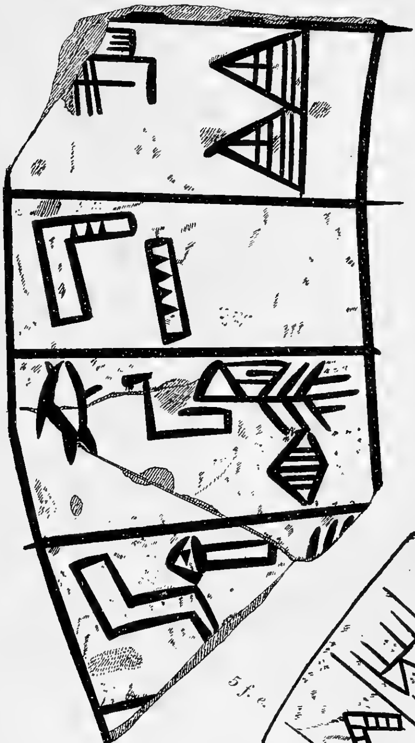
106



107



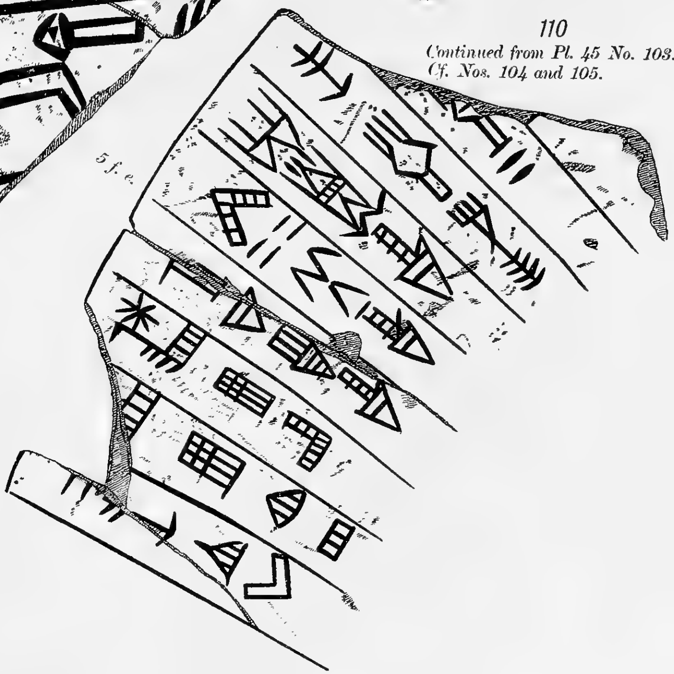
109



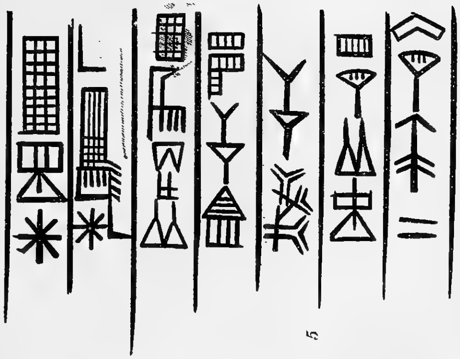
108

110

Continued from Pl. 45 No. 103.
Cf. Nos. 104 and 105.



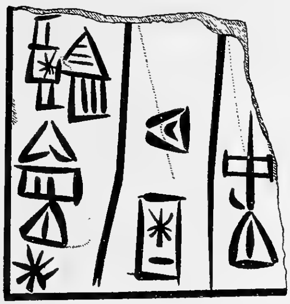
112



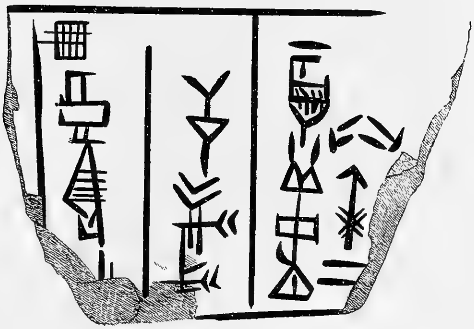
114

113

111



Several lines wanting.



115

After a break of several lines Pl. 49 No. 117 follows.

116

Continued from Pl. 49 No. 117.

119

117

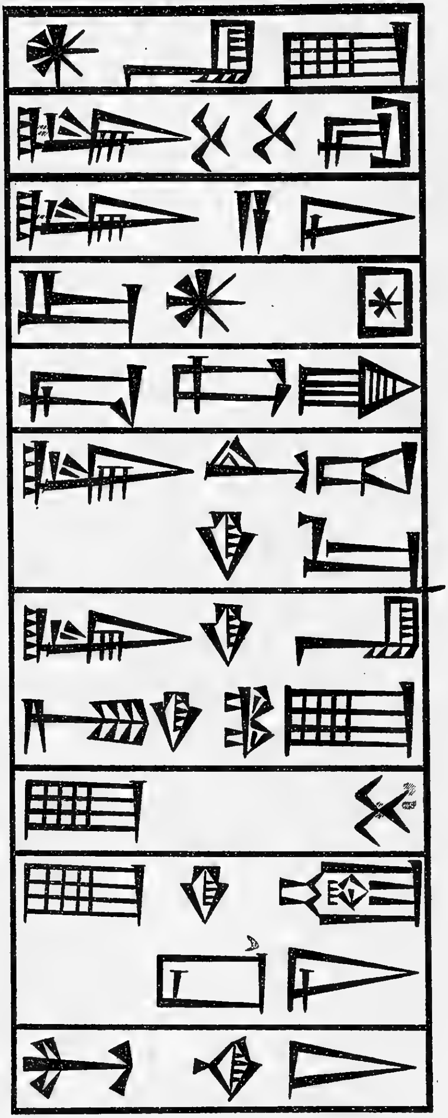
Continued on Pl. 48 No. 116.

4

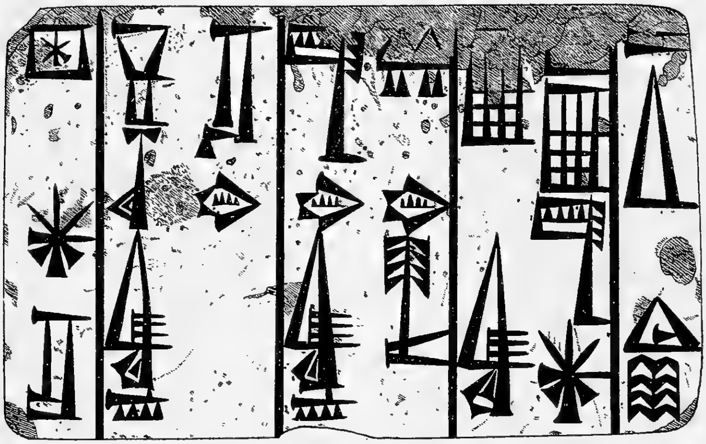
118

120

121

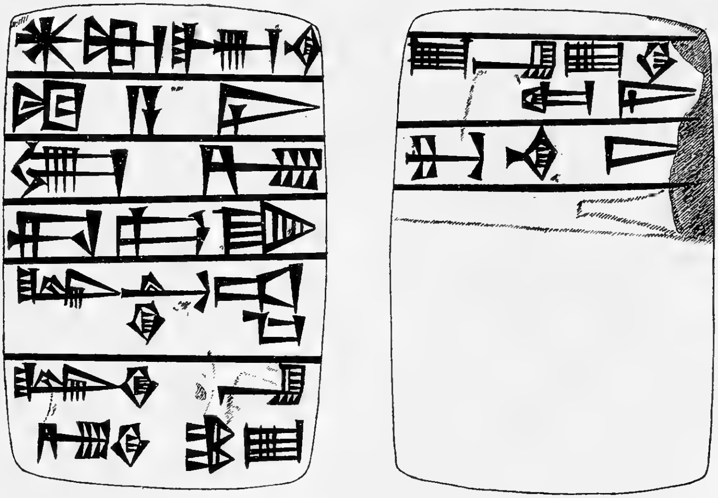


122



123

Obverse. Reverse.



124 Obverse.

Col. I. Col. II. Col. III. Col. IV. Col. V. Col. VI.

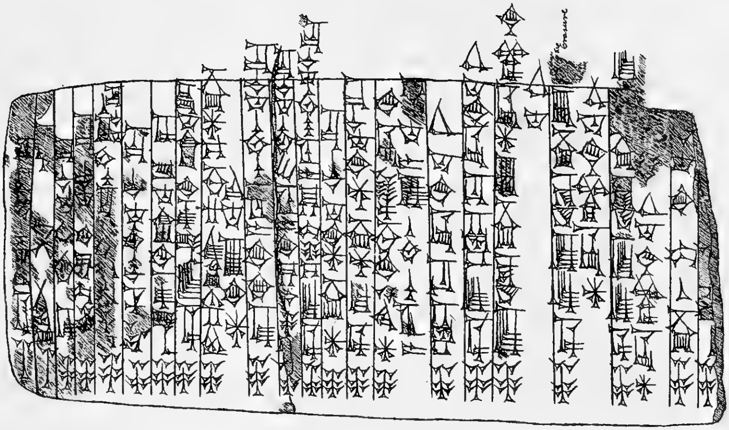
×Col. I, 21: Erasure of the scribe.

124 Reverse.

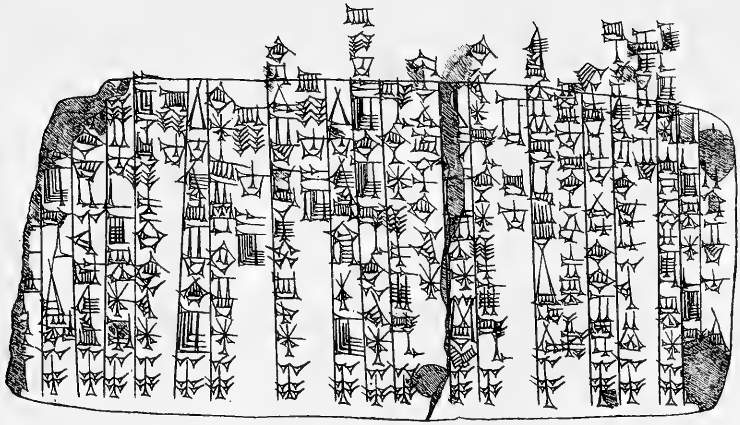
Col. I. Col. II. Col. III. Col. IV. Col. V. Col. VI.

125

Reverse.



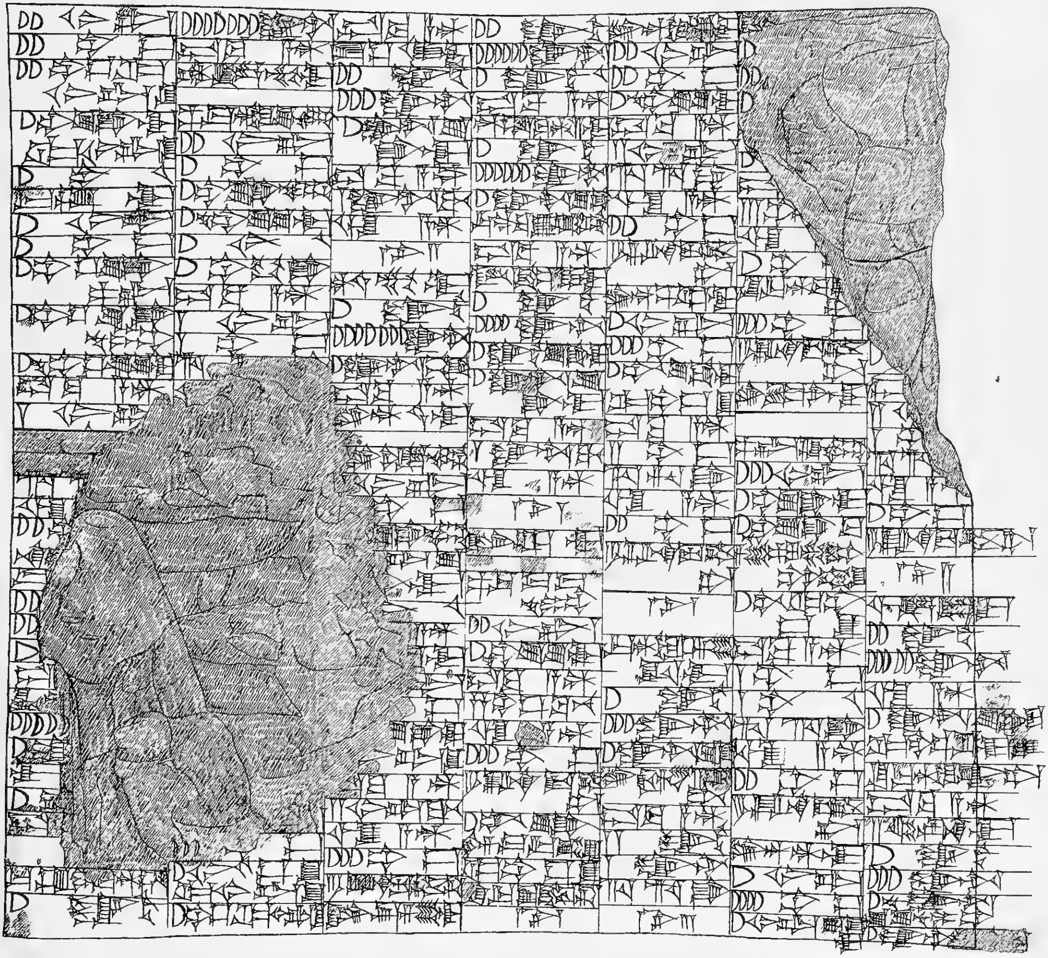
Obverse.



126

Obverse.

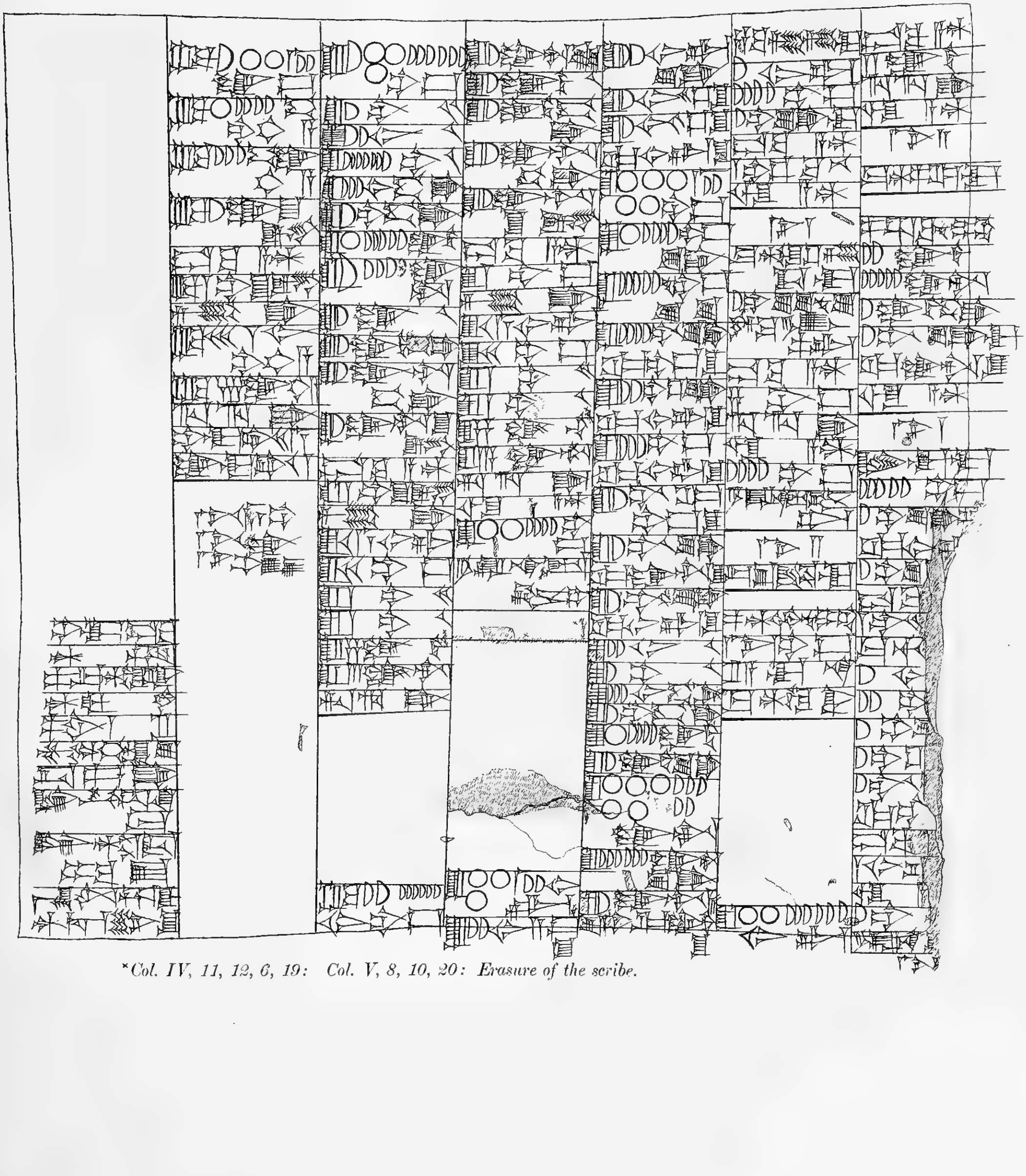
Col. I. Col. II. Col. III. Col. IV. Col. V. Col. VI. Col. VII.



126

Reverse.

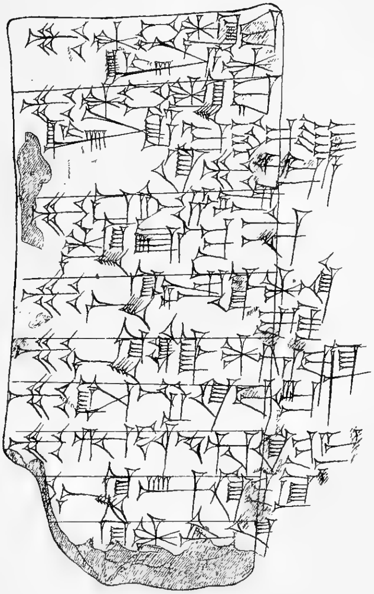
Col. VII. Col. VI. Col. V. Col. IV. Col. III. Col. II. Col. I.



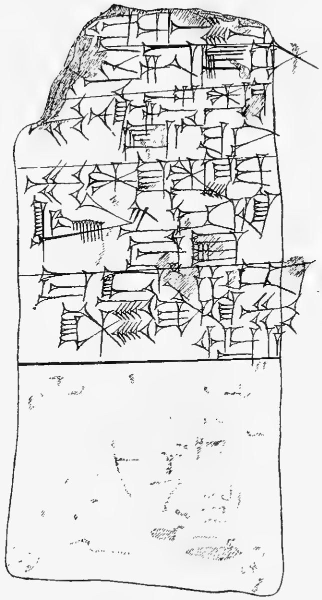
ˣCol. IV, 11, 12, 6, 19: Col. V, 8, 10, 20: Erasure of the scribe.

127

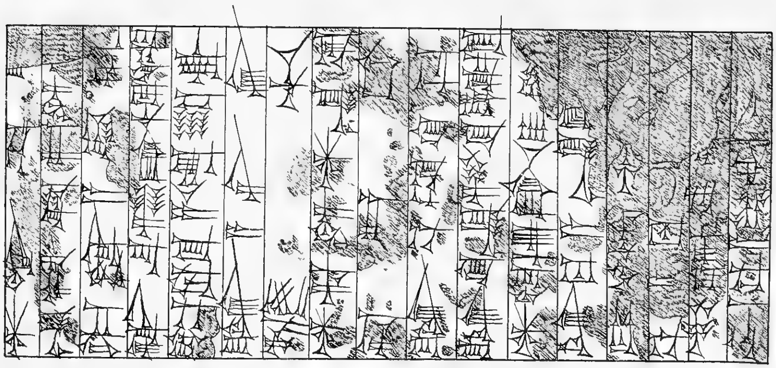
Obverse.



Reverse.

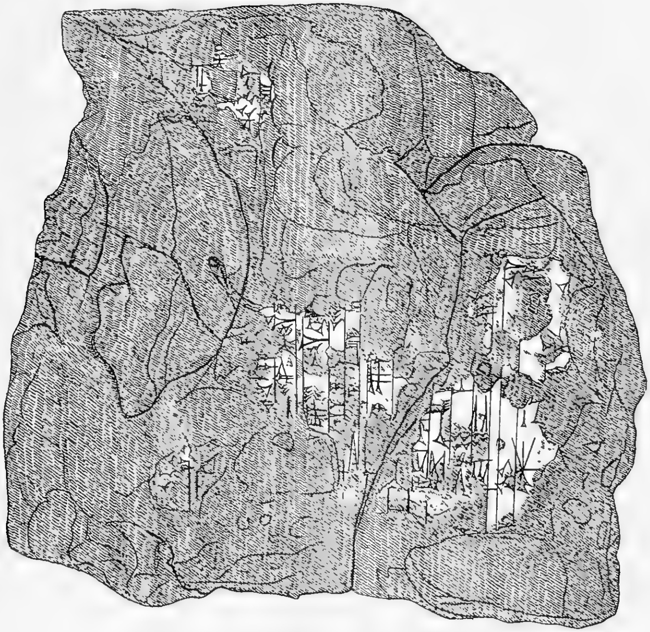


128

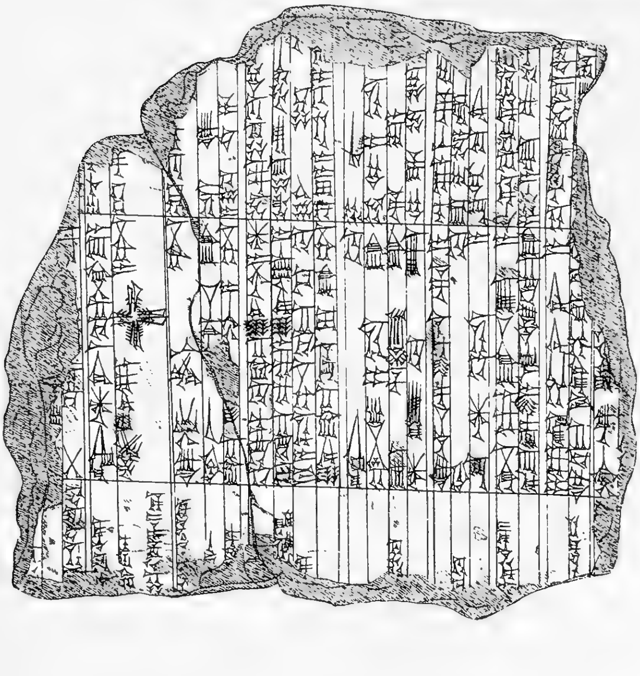


129

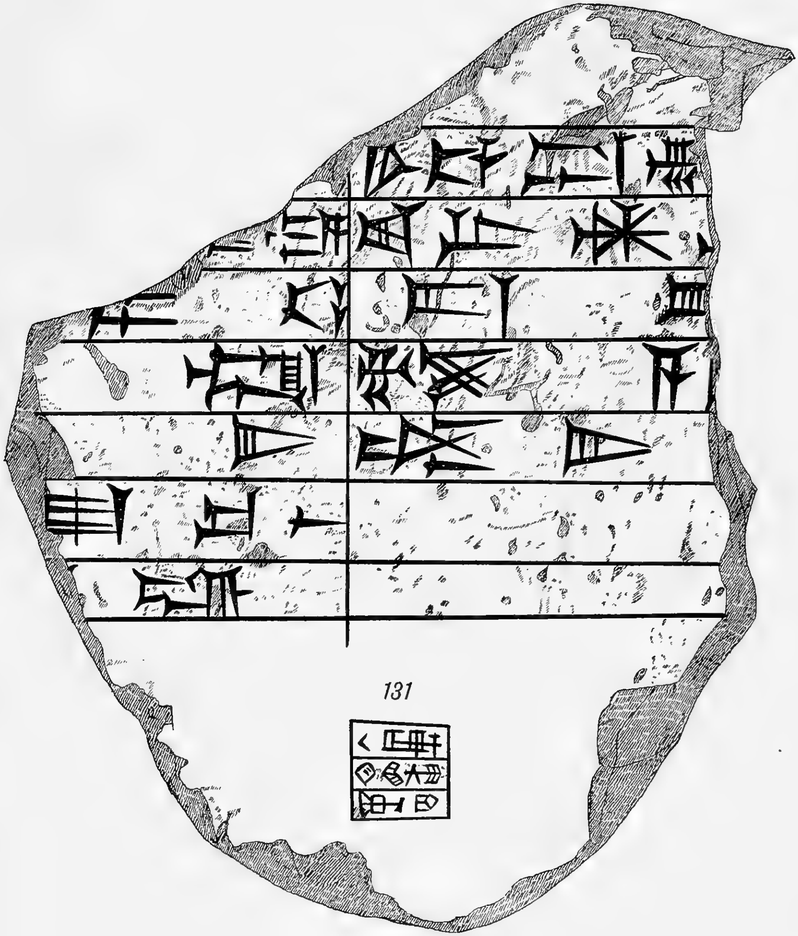
Reverse.



Obverse.



130



131

133

Obverse.

132

133

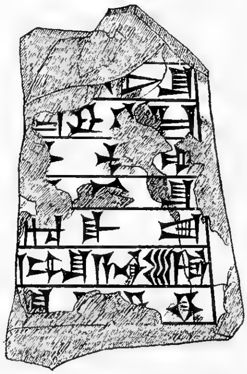
Reverse.

134

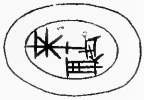
135

138

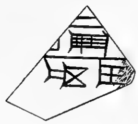
136



139



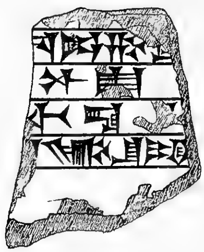
140



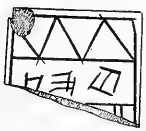
141

142

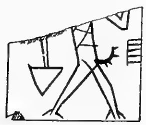
137



143
Obverse.

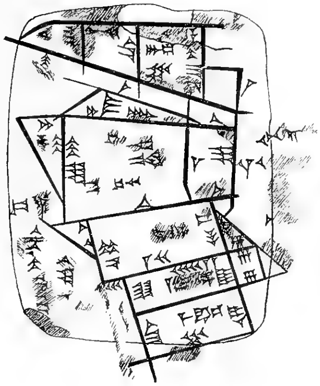


143
Reverse.

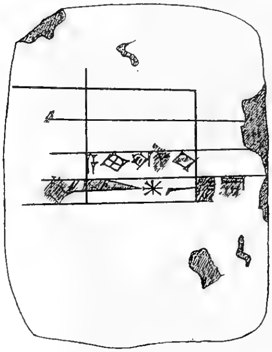


144

Obverse.

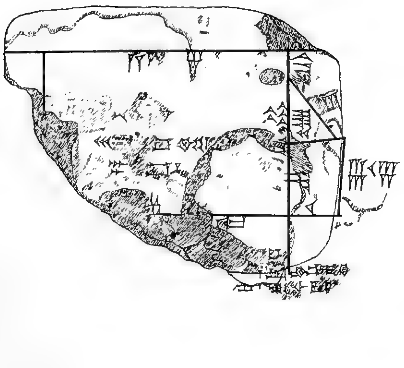


Reverse.

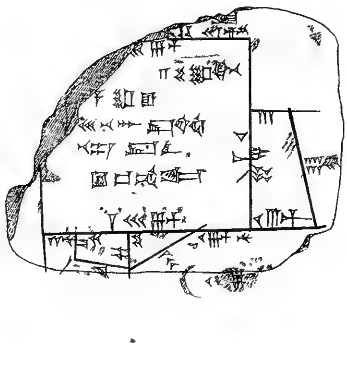


145

Obverse.

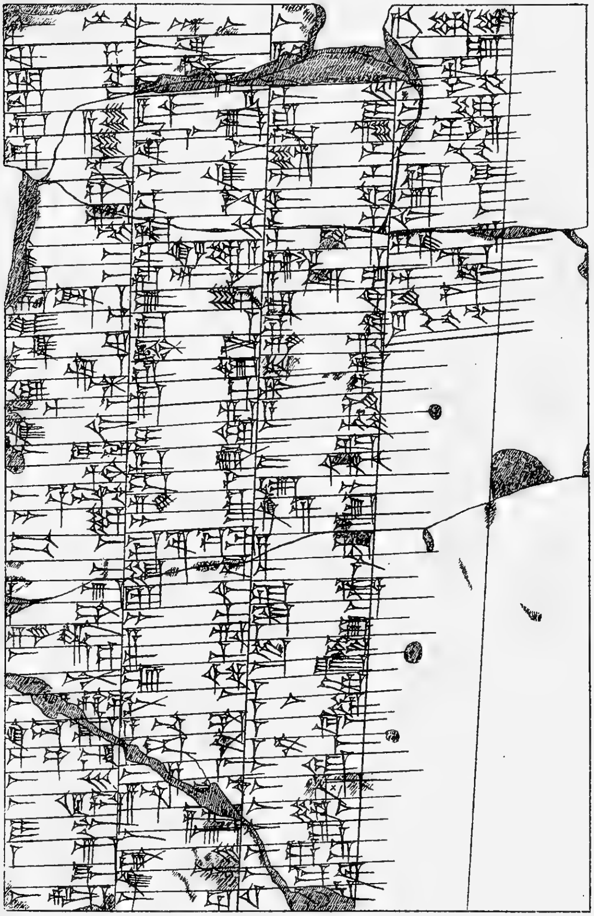


Reverse.



146

Col. I. Col. II. Col. III. Col. IV.

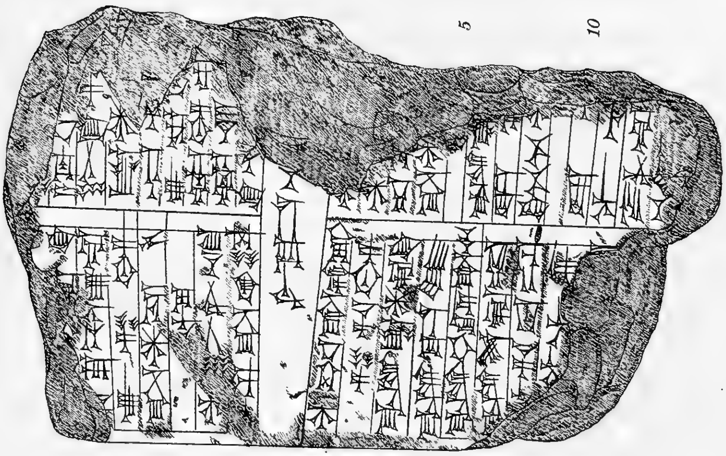


Col. III, 17: Read the rest is erasure of the scribe.

Col. III, 38: Read the rest is erasure of the scribe.

148

Col. I. Col. II.

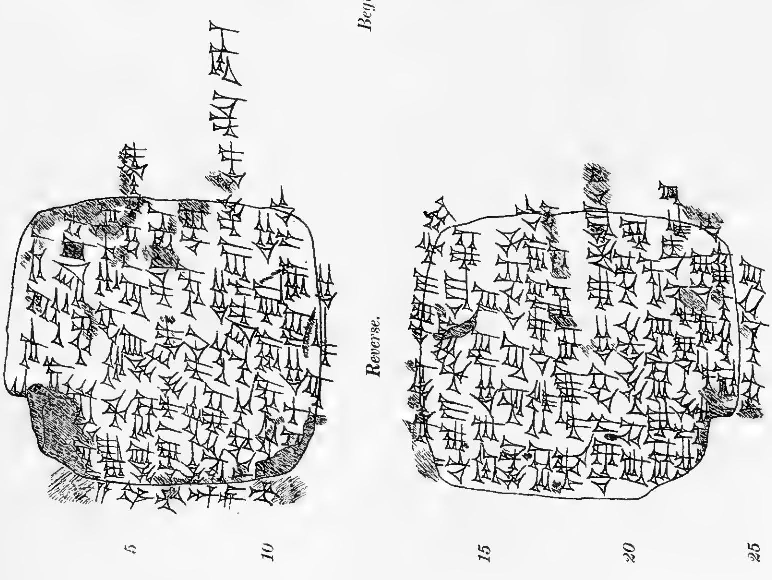


End. 5 f. e. Beginning.

147

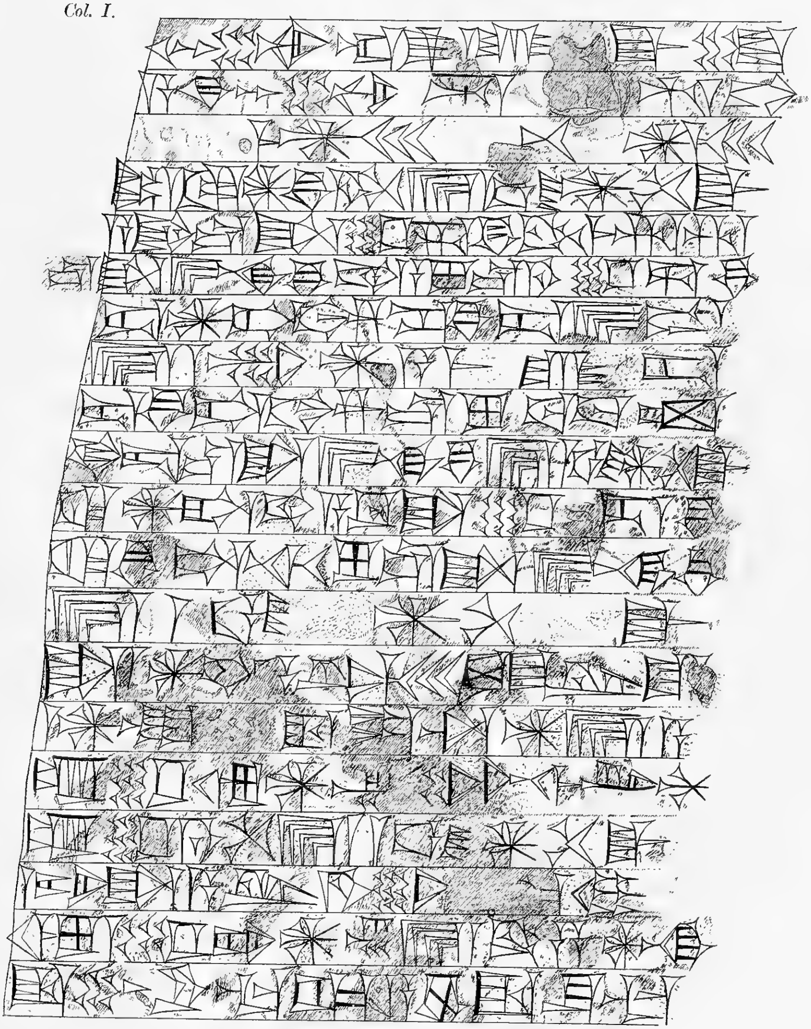
Obverse.

Reverse.



149

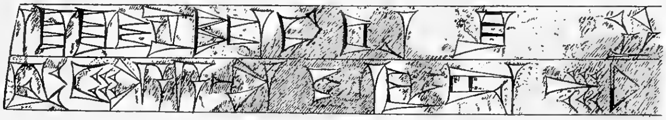
Col. I.



149

Continued

Col. I.

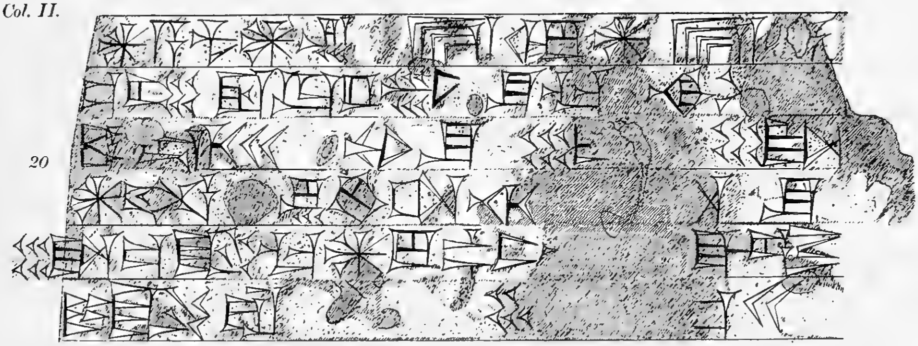


Col. II.

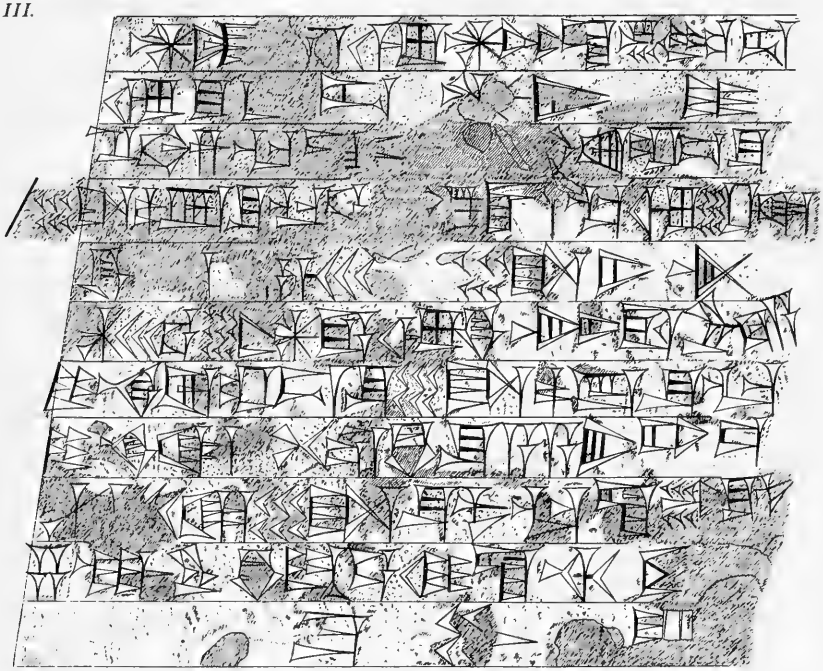
149

Continued

Col. II.

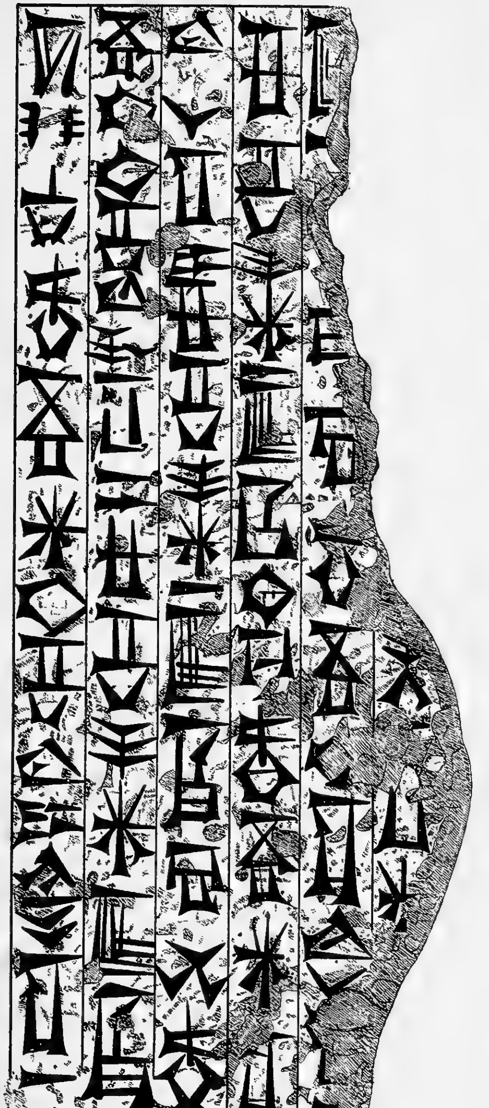


Col. III.



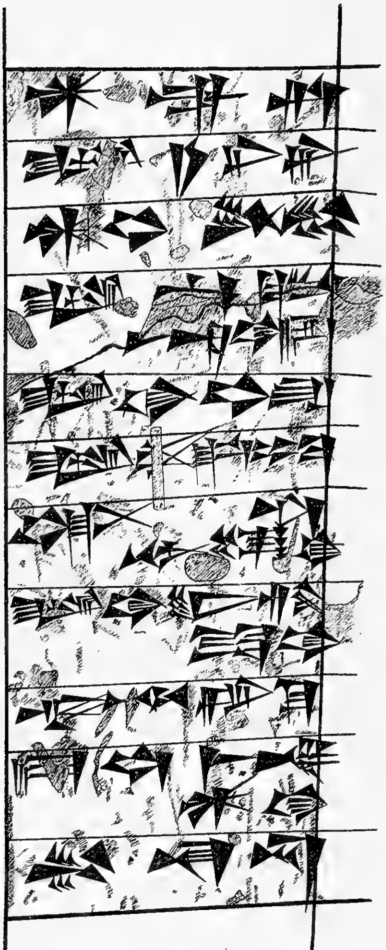
150

Col. I.



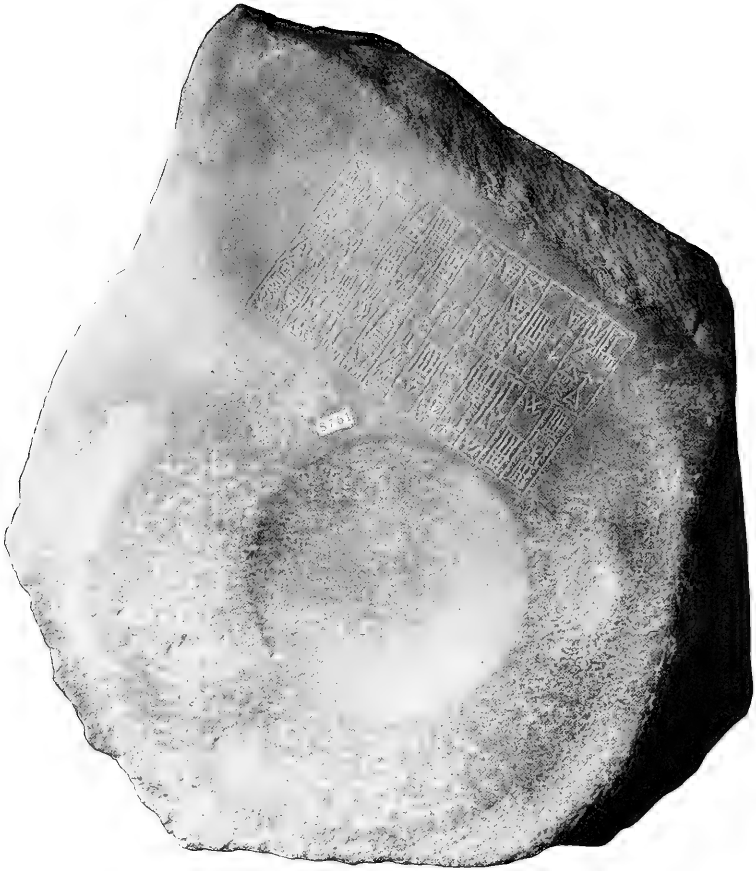
Col. II.

151



*L. 3: *Erasure of the scribe.*

152



1

DOOR-SOCKET OF SARGON I.
Nippur.

2

3

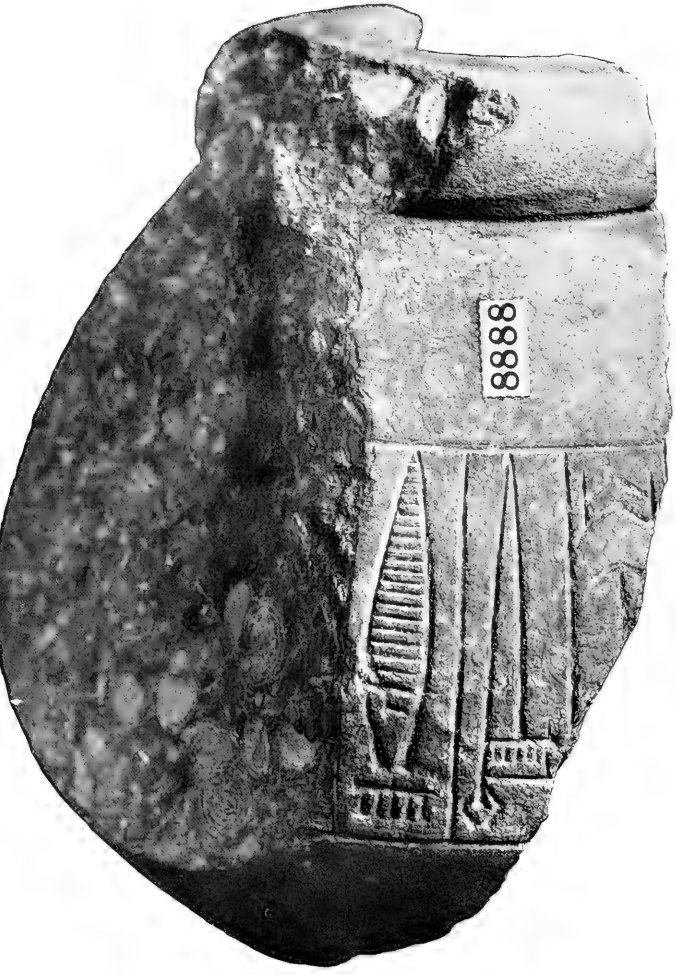
CLAY STAMPS FOR BRICKS.

Nippur.

2. Sargon I, Reverse. 3. Narâm Sin, Obverse.

VASE FRAGMENTS OF ALUSHARSHID (URU-MU-USH).

Nippur.



13

VASE FRAGMENT OF ALUSHARSHID (URU-MU-USH).

Nippur.

14

VASE FRAGMENT OF ALUSHARSHID (URU-MU-USH).
Nippur.

15

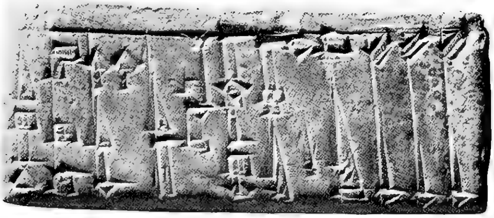
FRAGMENT OF A MARBLE SLAB: OBVERSE.

Abu Habba.

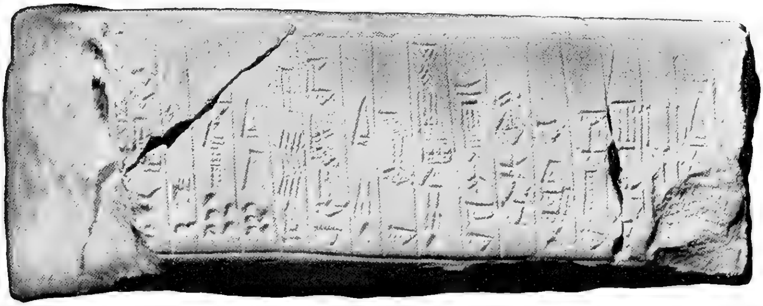
16

FRAGMENT OF A MARBLE SLAB: REVERSE.

Abu Habba.



18



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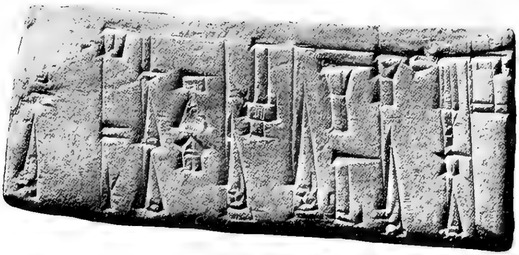
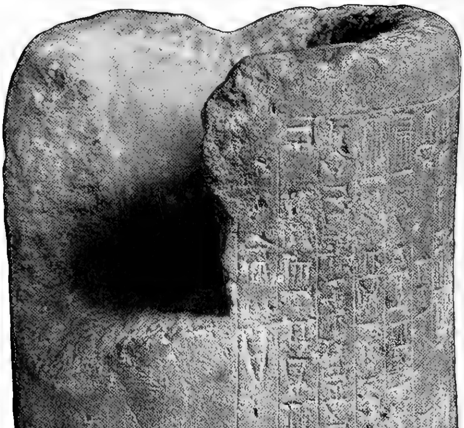


19

17. FRAGMENT OF A MARBLE SLAB: EDGE—Abu Habba.

18, 19. Tablets of Baked Clay—Yokha.

20



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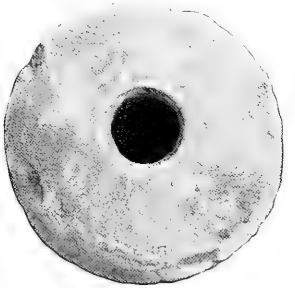
20. STAMP OF HAMMURABI. 21. MORTAR OF BURNABURIASH.

Northern Babylonia.



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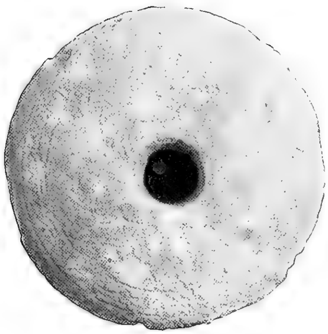


24

KNOBS OF SCEPTRES—Nippur.

22, 24. Magnesite (top view), Nazi-Maruttash. 23. Ivory (side view), Burnaburiash.

25

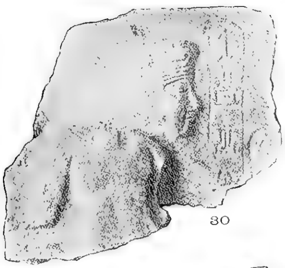
26

27

28

VOTIVE OBJECTS IN LAPISLAZULI AND IMITATION.

Nippur.



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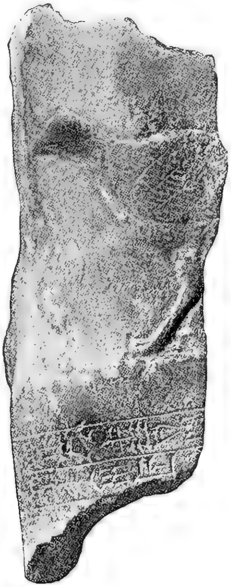


33

FRAGMENTS OF INSCRIBED BAS-RELIEFS.

Nippur.

34

POINTED CLAY CYLINDER OF NABOPOLASSAR
Babylon.

35

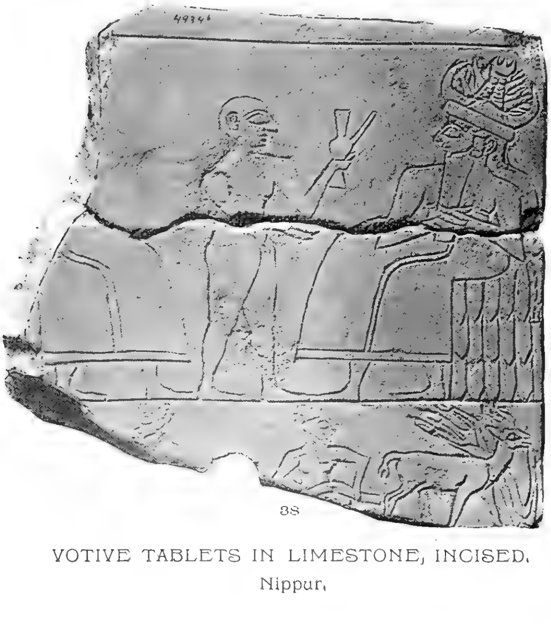
BARREL-SHAPED CLAY CYLINDER OF NEBUCHADREZZAR II.
Babylon.

36

PLAN OF THE FIRST YEAR'S EXCAVATIONS AT NIPPUR.

The Roman numbers indicate the places where excavations were made; the Arabic, the height of the mounds, in metres, above the present level of the canal bed. About five metres must be added to obtain the actual height above the plain. III Ekur—Bint el-Amîr (Temple). VII Nîmit-Marduk (Wall).

37



38

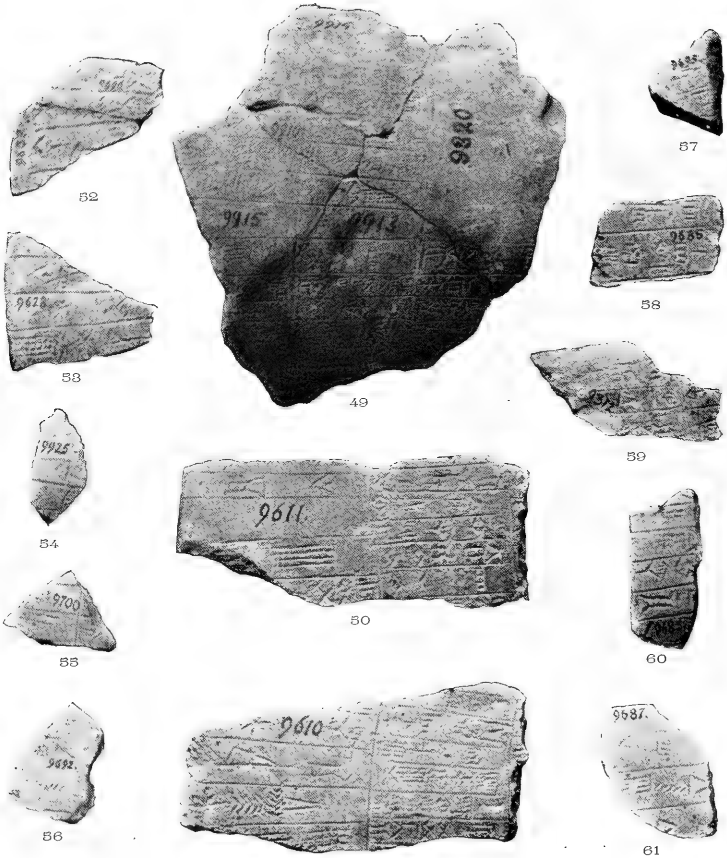
VOTIVE TABLETS IN LIMESTONE, INCISED.

Nippur.

39

MARBLE BLOCK OF LUGALKIGUBNIDUDU.
Nippur.

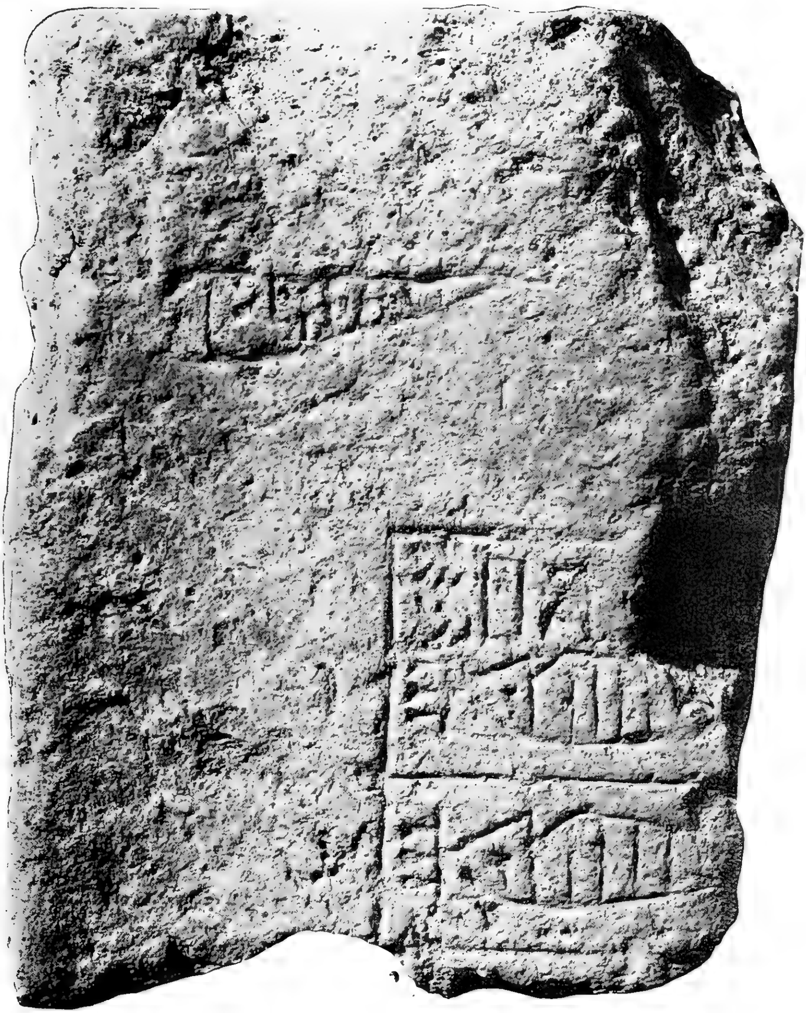
VASE FRAGMENTS OF LUGALKIGUBNIDUDU.
Nippur.



VASE FRAGMENTS OF LUGALZAGGISI.
Nippur.

62

VASE OF ALUSHARSHID (URU-MU-USH).
Nippur.



63

BRICK OF SARGON I.
Nippur.

64

INSCRIBED BAS-RELIEF OF NARAM-SIN.

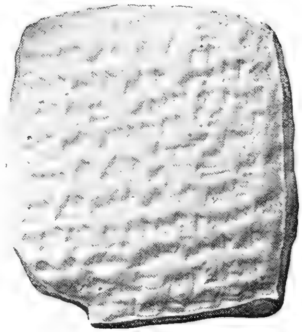
Diarbekir.

65

BRICK OF UR-NINIB—Nippur.

Inscription begins at bottom.

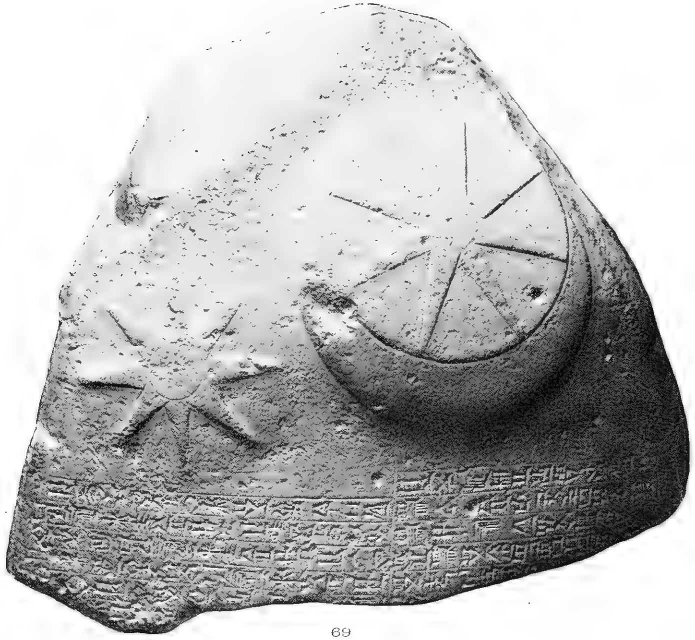
66



67

68

66, 67. CLAY TABLET (OBVERSE AND REVERSE).—Tell el-Hesy.
68. Fragm. of a barrel-cylinder of Mardukshabikzerim.—Place unknown.



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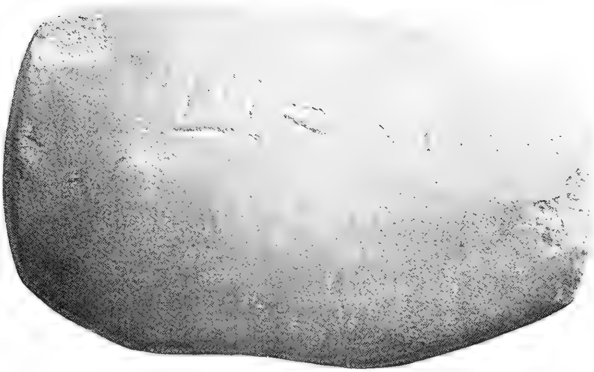


70

69. Fragm. of a Boundary Stone. 70. Inscribed Pebble.
Nippur.

71

BAS-RELIEF IN CLAY WITH AN ARAMAIC INSCRIPTION.

Nippur.

TERRA COTTA VASE WITH ROPE PATTERN, C. 4000 B. C.—Nippur.

Height, 63.5 cm.; diameter at the top, 53 cm.

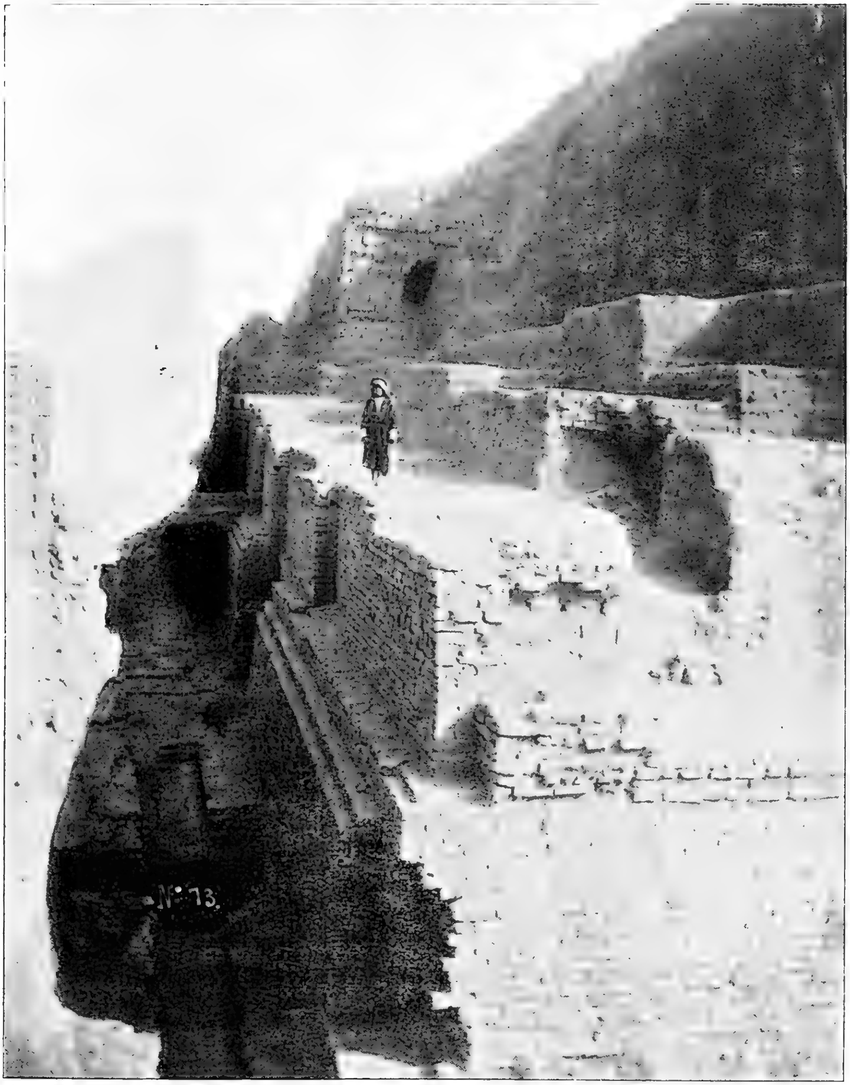
Found in an upright position 5.1 m. below the eastern foundation of Ur-Gur's Ziggurrat, and 3.05 m. below a pavement which consists entirely of burned bricks of Sargon I and Narâm-Sin. It stood 7 m. south-east from an altar, the top of which was c. 2.40 m. higher than that of the vase.

73

ARCH OF BURNED BRICK LAID IN CLAY MORTAR, C. 4000 B. C.—Nippur.

71 cm. high, 51 cm. span, 33 cm. rise.

At the orifice of an open drain passing under the eastern corner of Ur Gur's Ziggurrat, c. 7 m. below the foundation of the same, and 4. 57 m. below a pavement which consists entirely of burned bricks of Sargon I and Narâm-Sin. View taken from inside the drain. Front of arch opened to let light pass through.



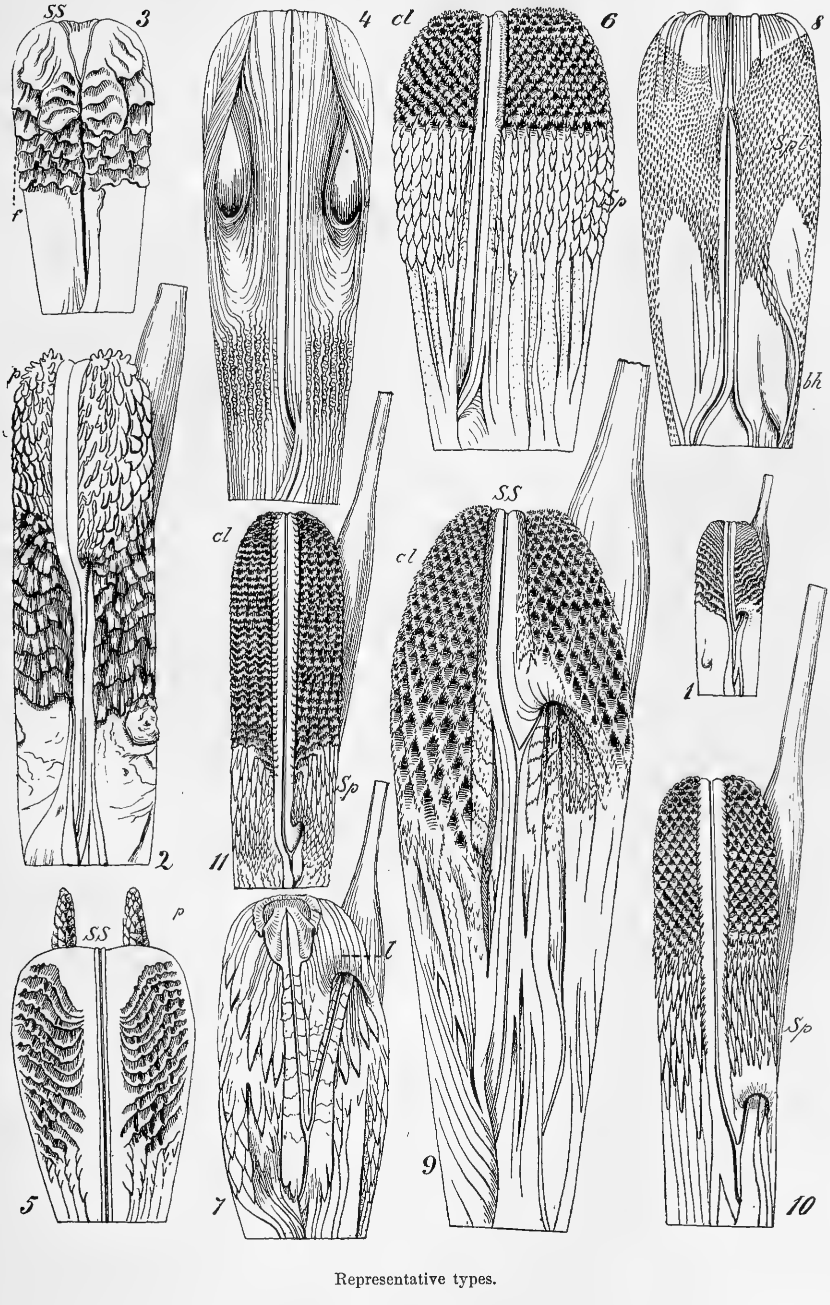
74

NORTH-WESTERN FACADE OF THE FIRST STAGE OF UR-GUR'S ZIGGURRAT.

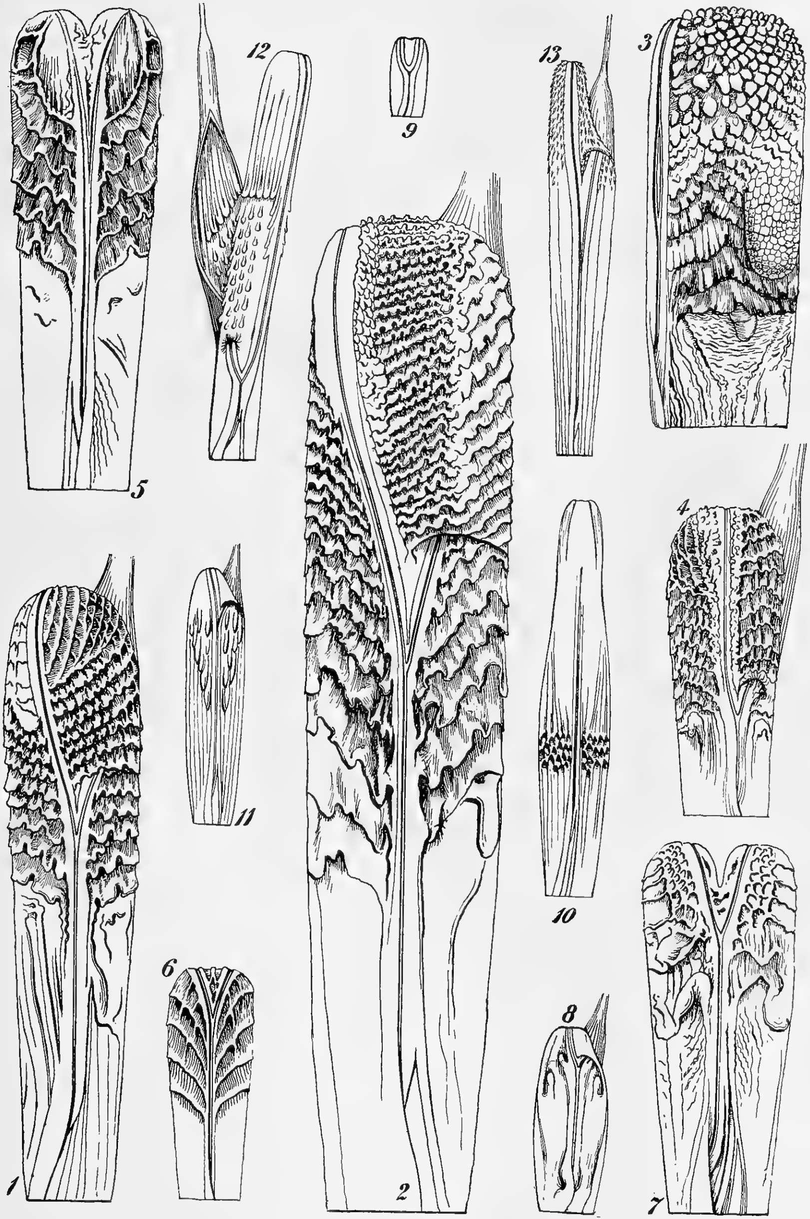
Nippur.

GENERAL VIEW OF THE EXCAVATIONS AT THE TEMPLE OF BEL.—SOUTH-EAST SIDE.

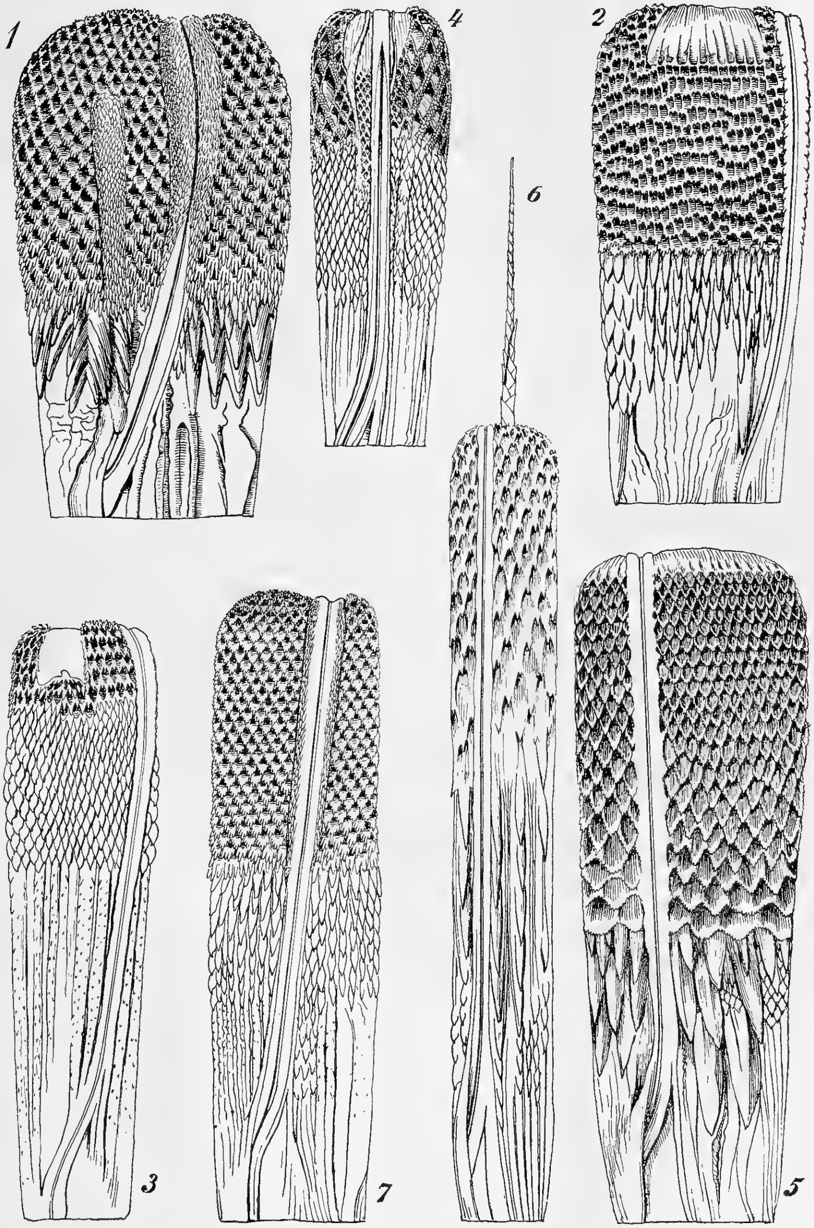
1, 6 (8), 7 (9)—Three stages of the Ziggurrat. 1—East corner of Ur-Gur's Ziggurrat. 2—Excavated rooms on the south-east side of the temple and separated from the latter by a street. 3—Causeway built by Ur-Gur, leading to the entrance of the Ziggurrat. 4—Deep trench extending from the great wall of the temple enclosure to the facade of Ur-Gur's Ziggurrat, 5—Modern building erected by Mr. Haynes in 1894, after an unsuccessful attempt by the Arabs to take his life.



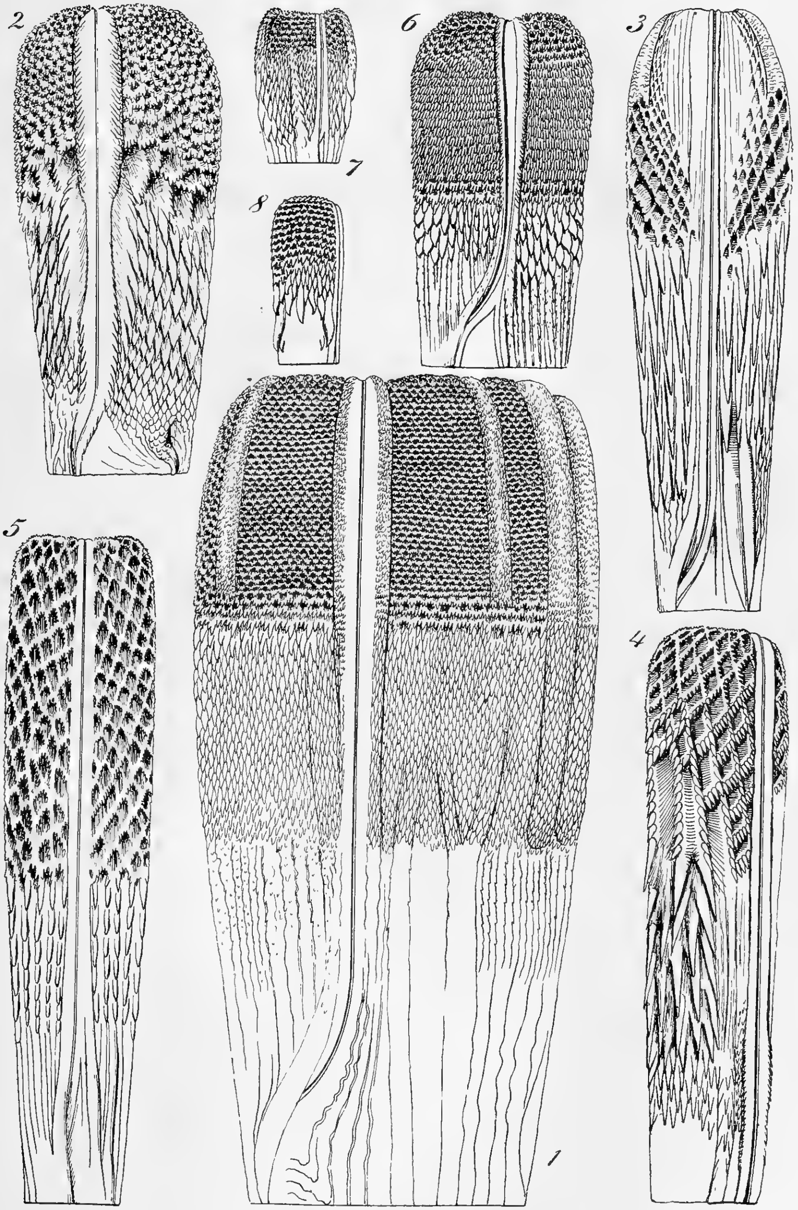
Representative types.



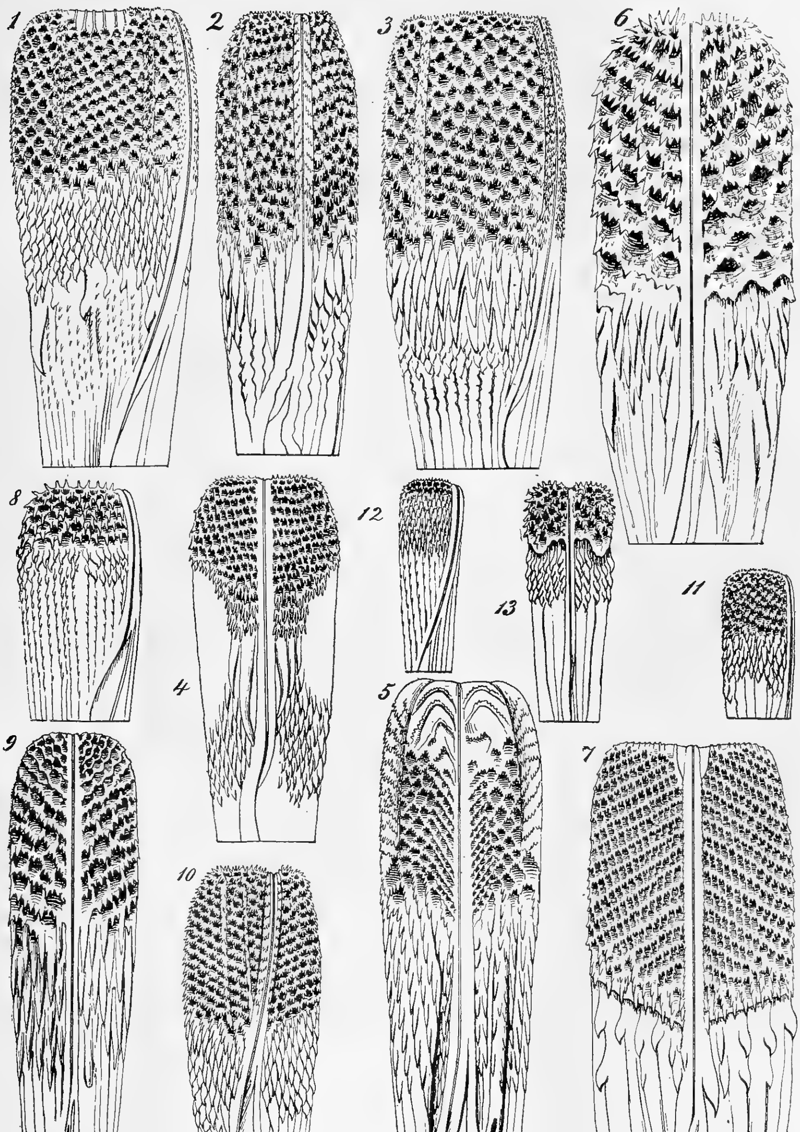
Tortricina. Peropoda. Calamariinæ.



Colubrinæ.



Colubrinæ.



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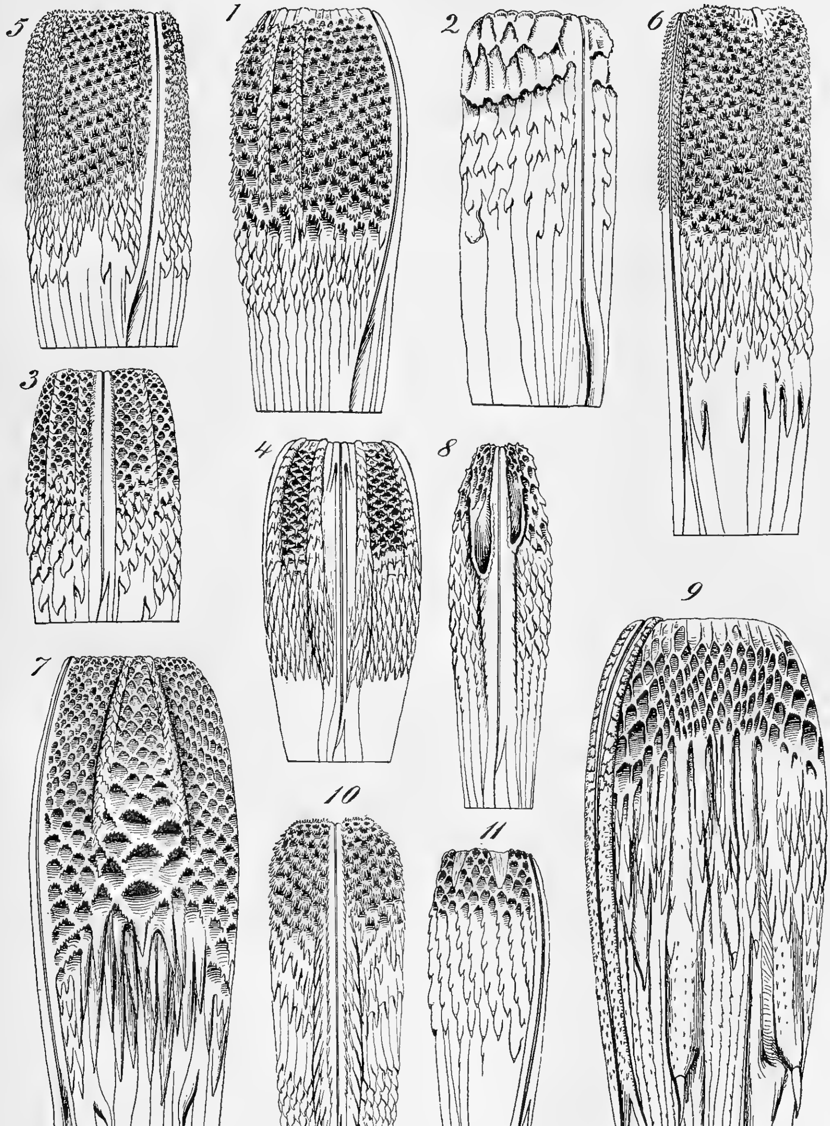

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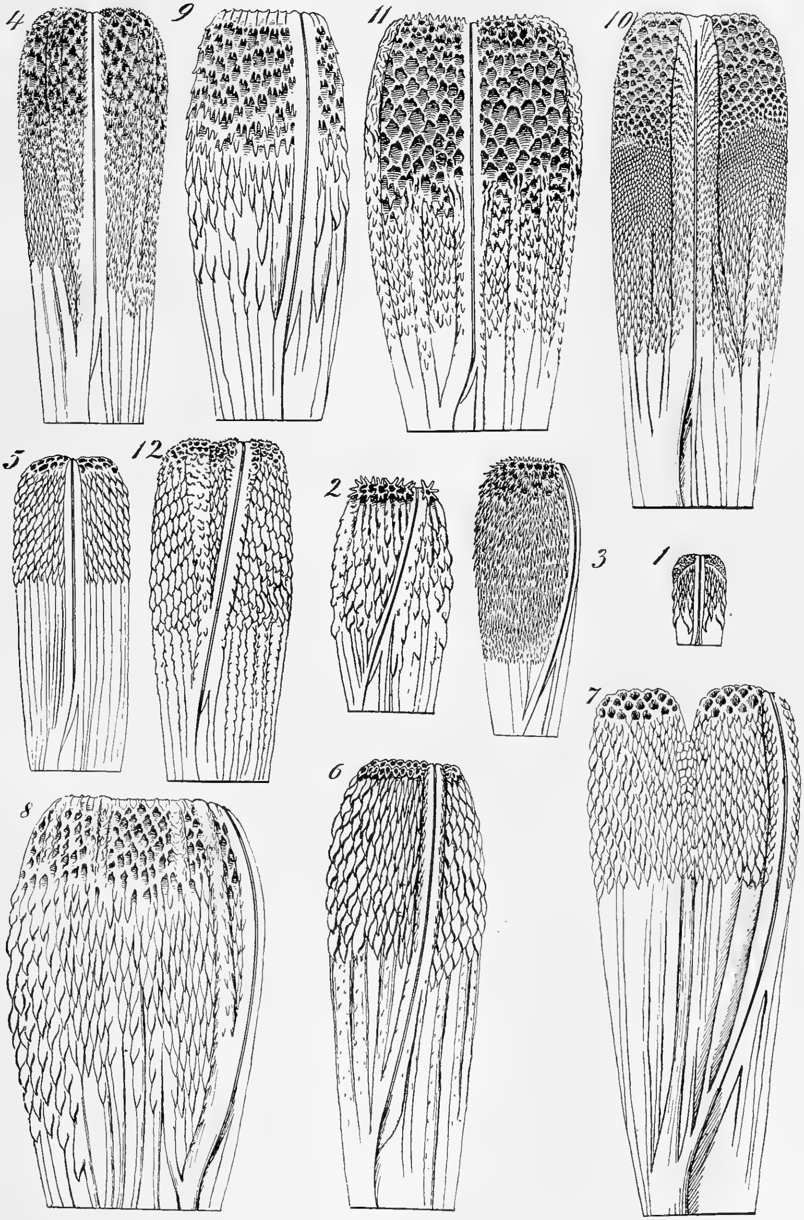

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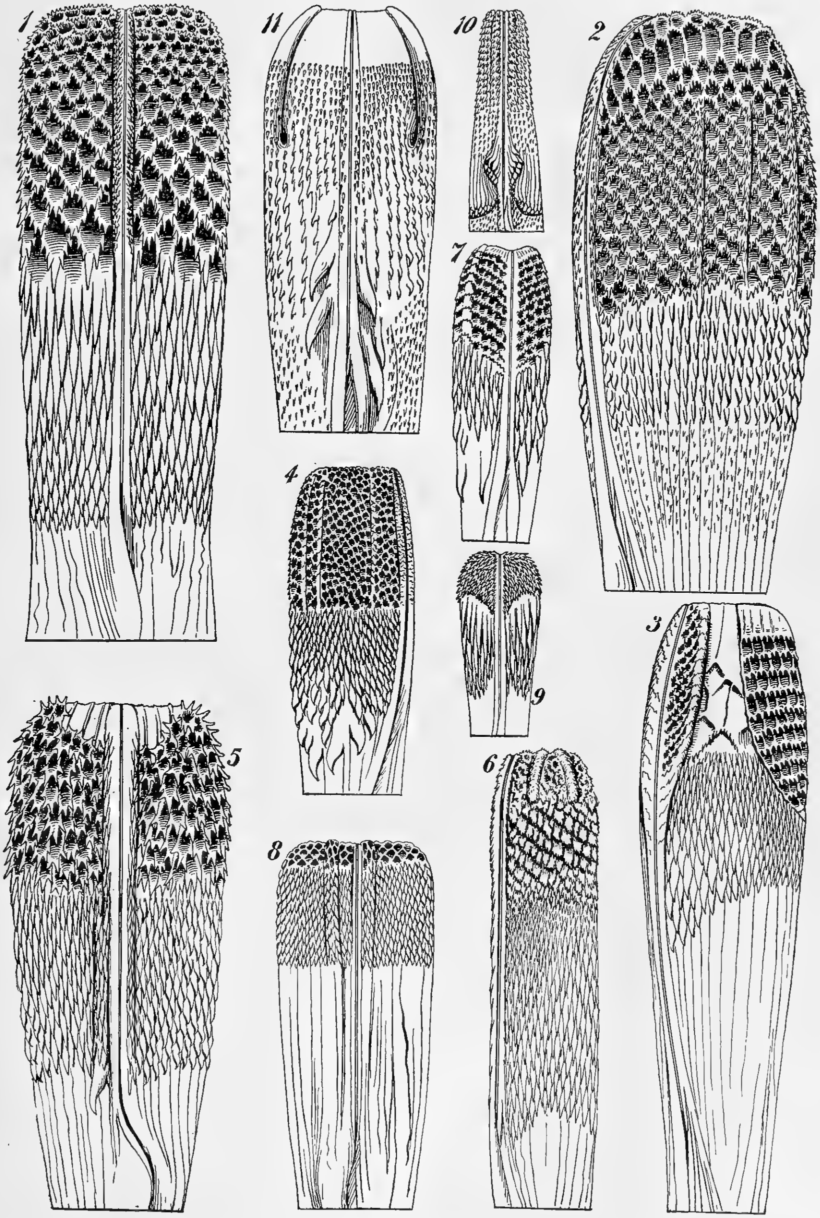
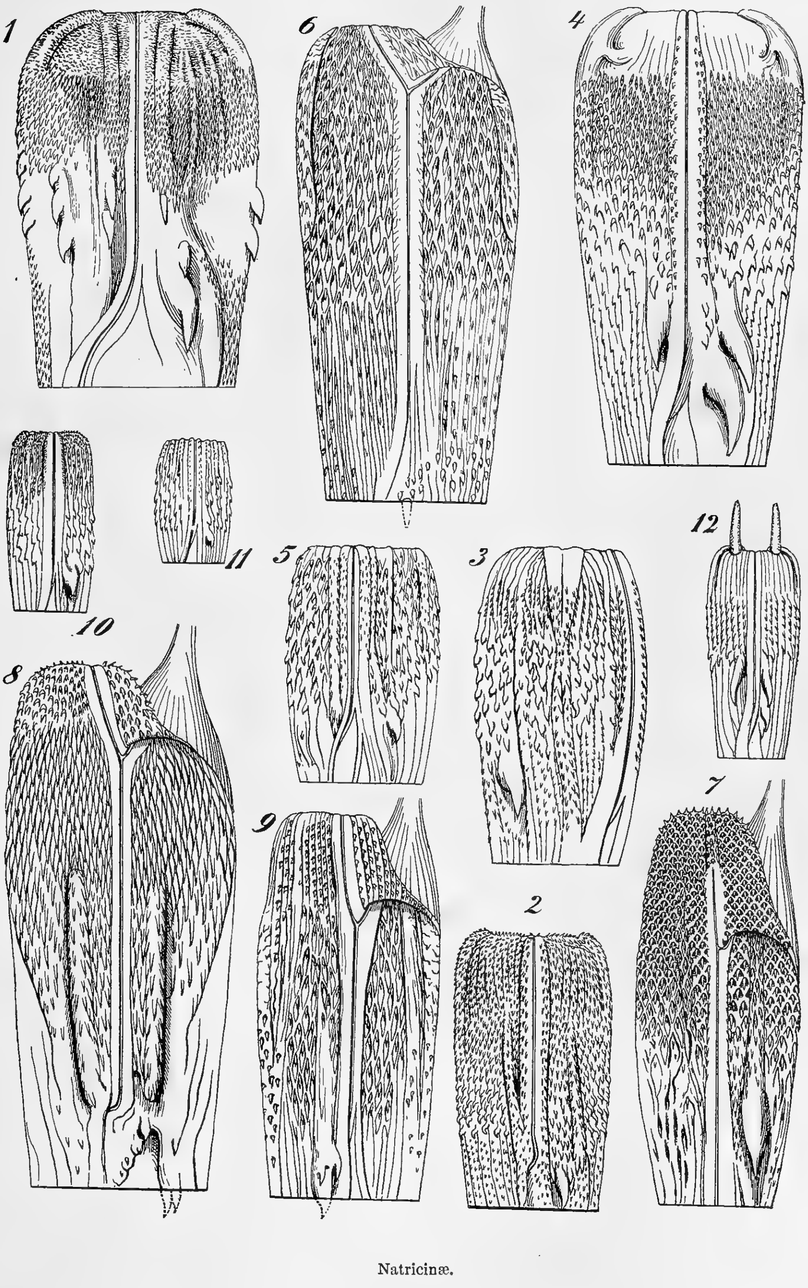
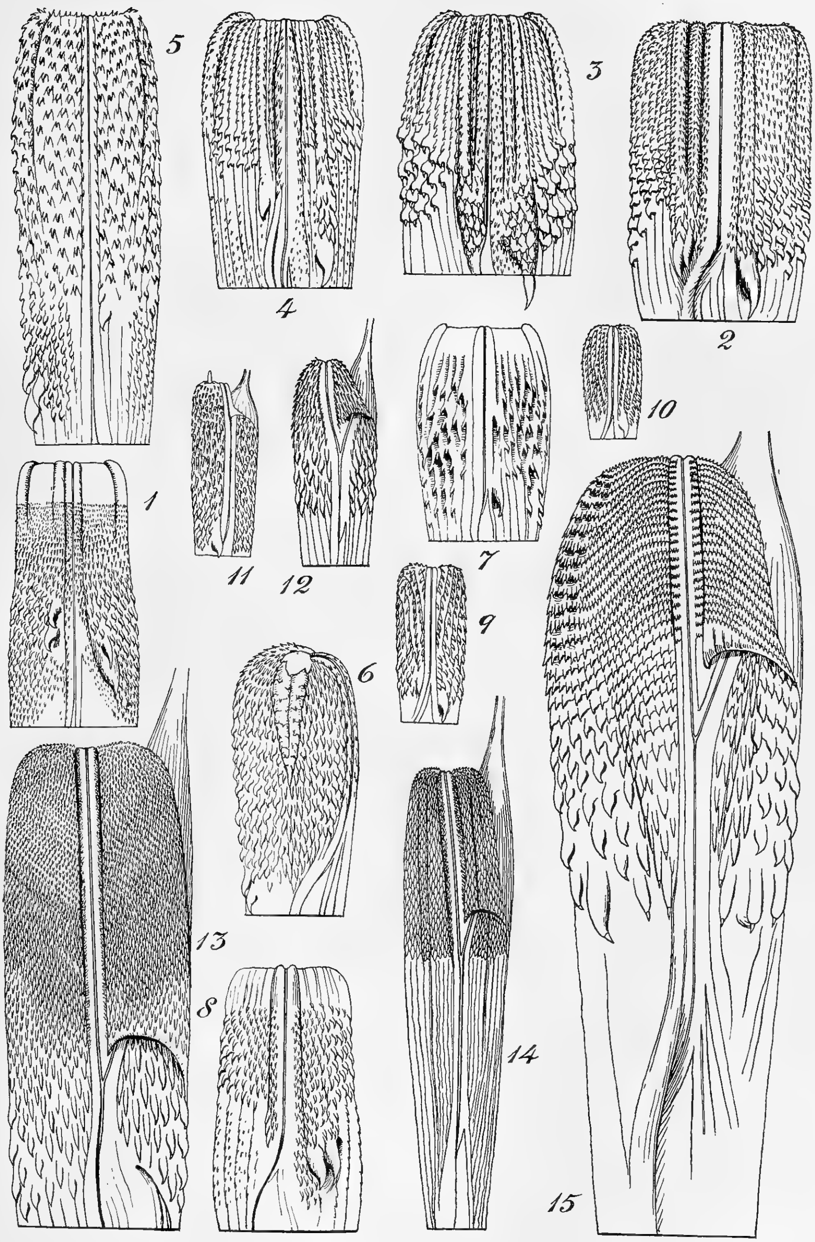


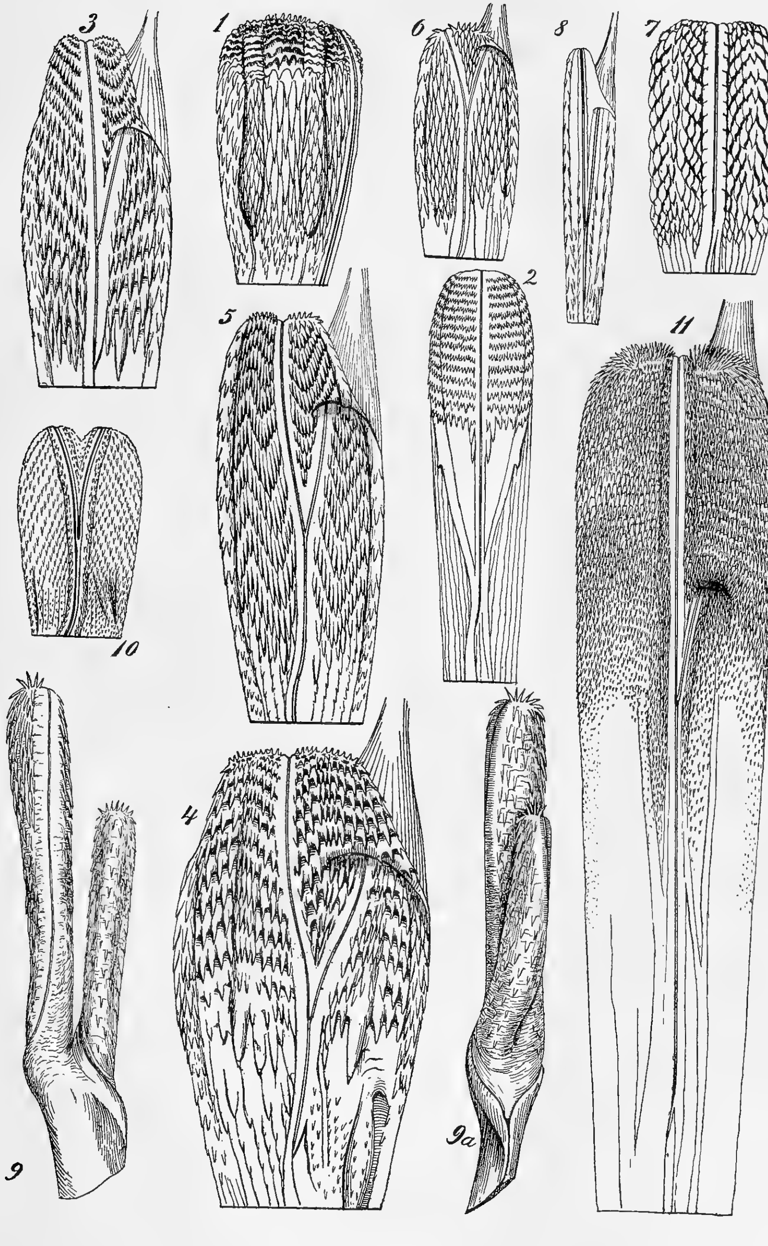
Colubrinæ. Natricinæ.



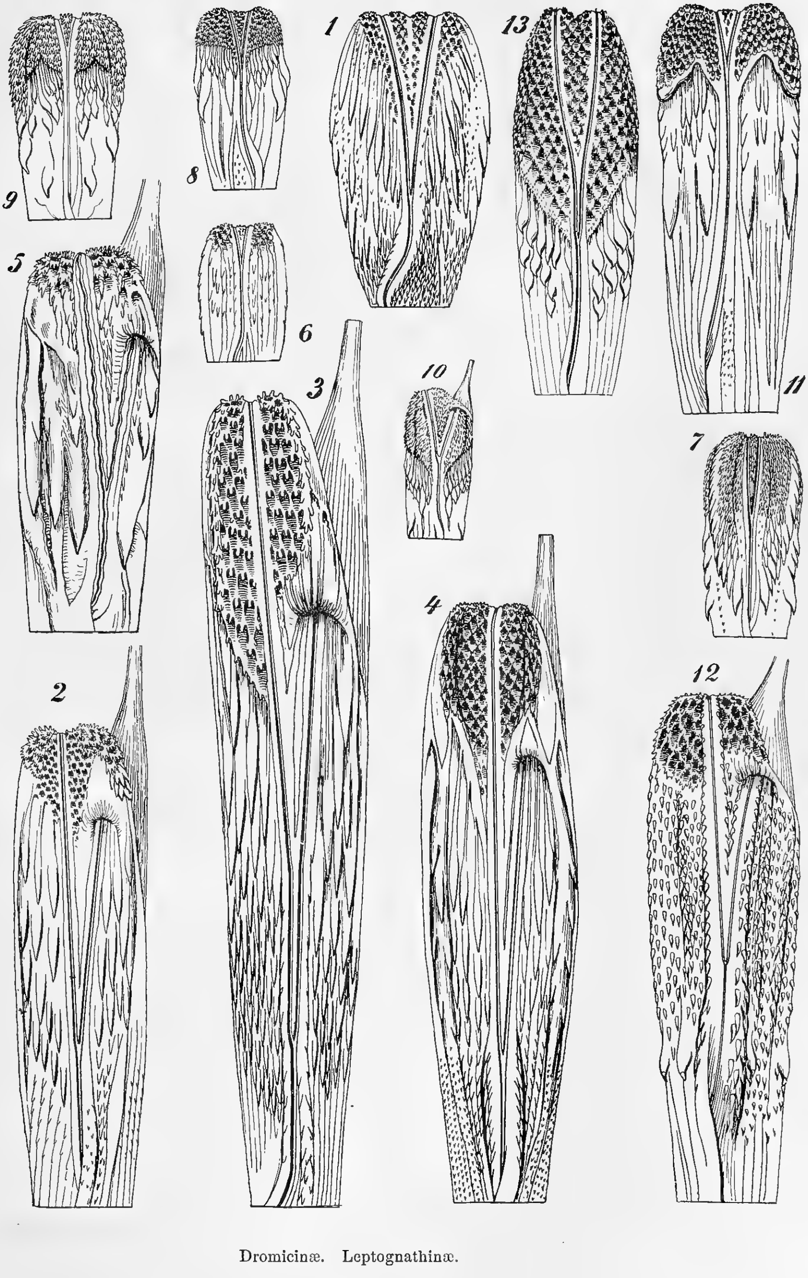
Natricinæ.



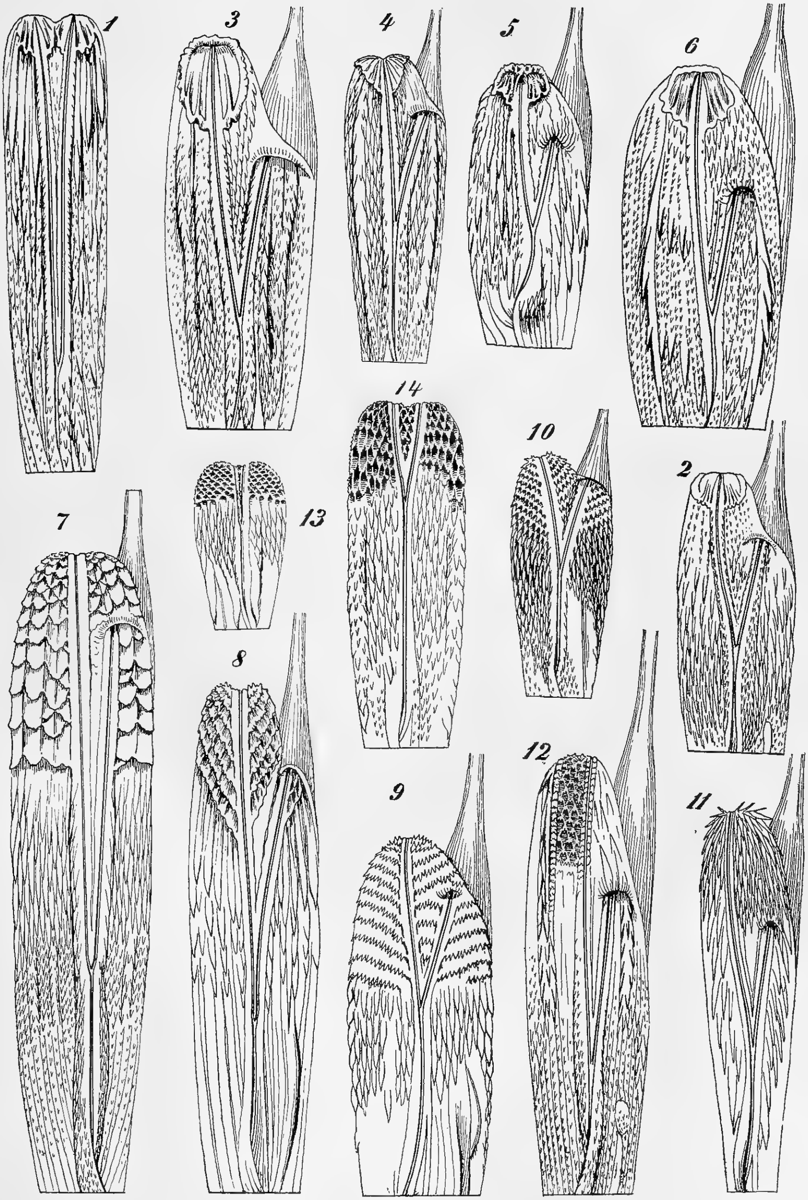
Natricinæ. Homalopsinæ.



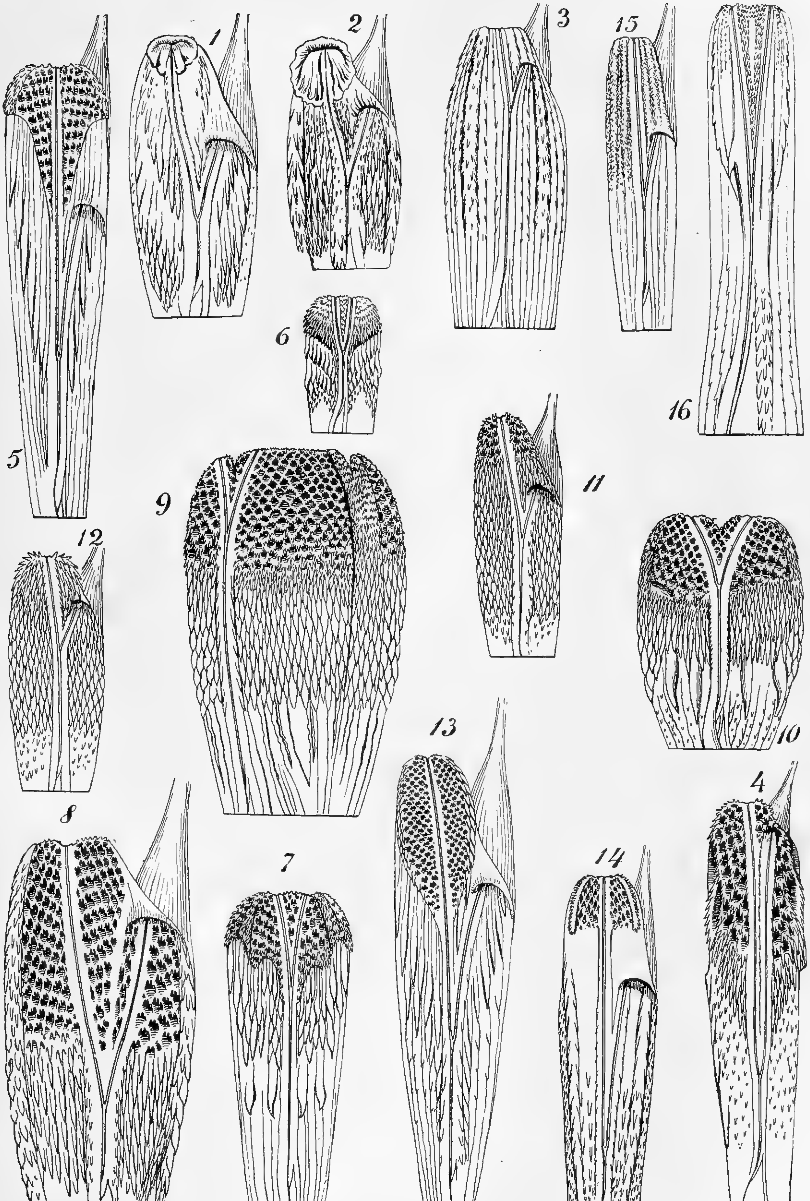
Lycodontinæ.



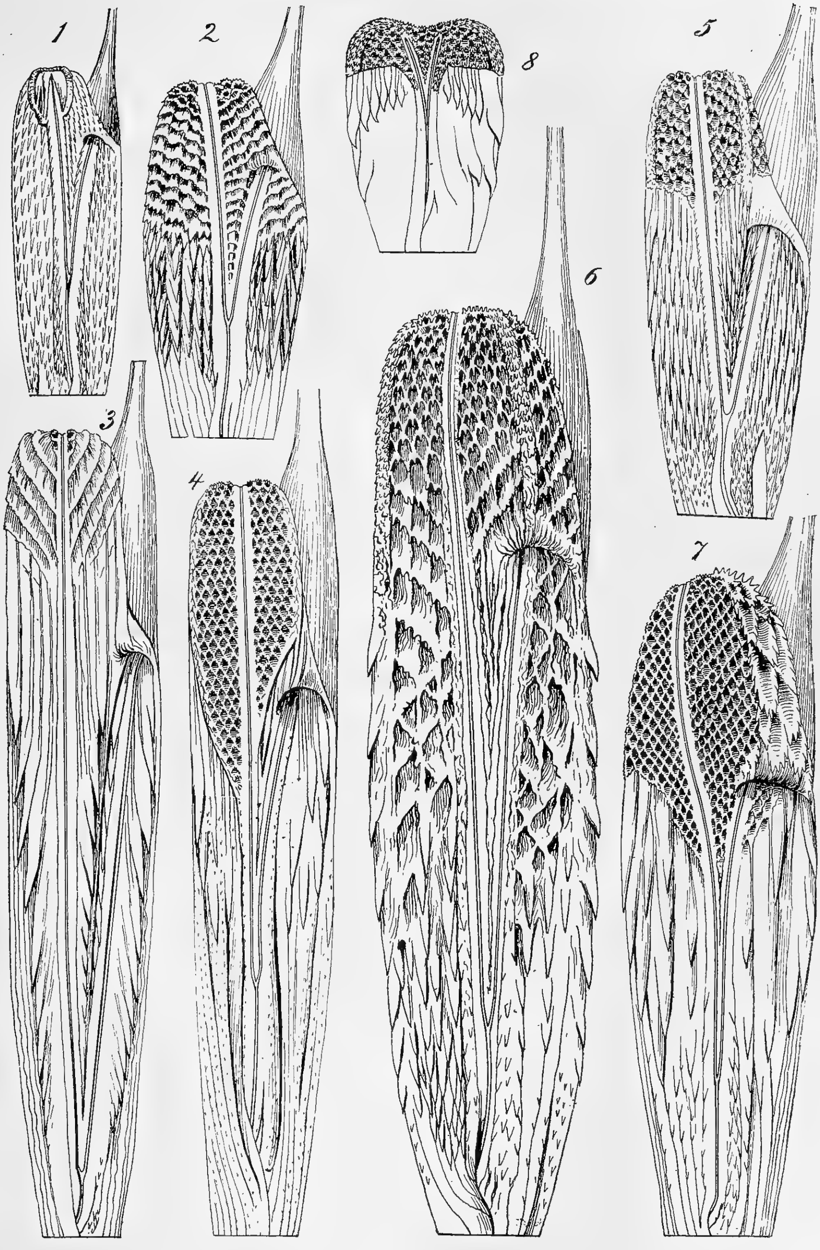
Dromicinæ. Leptognathinæ.



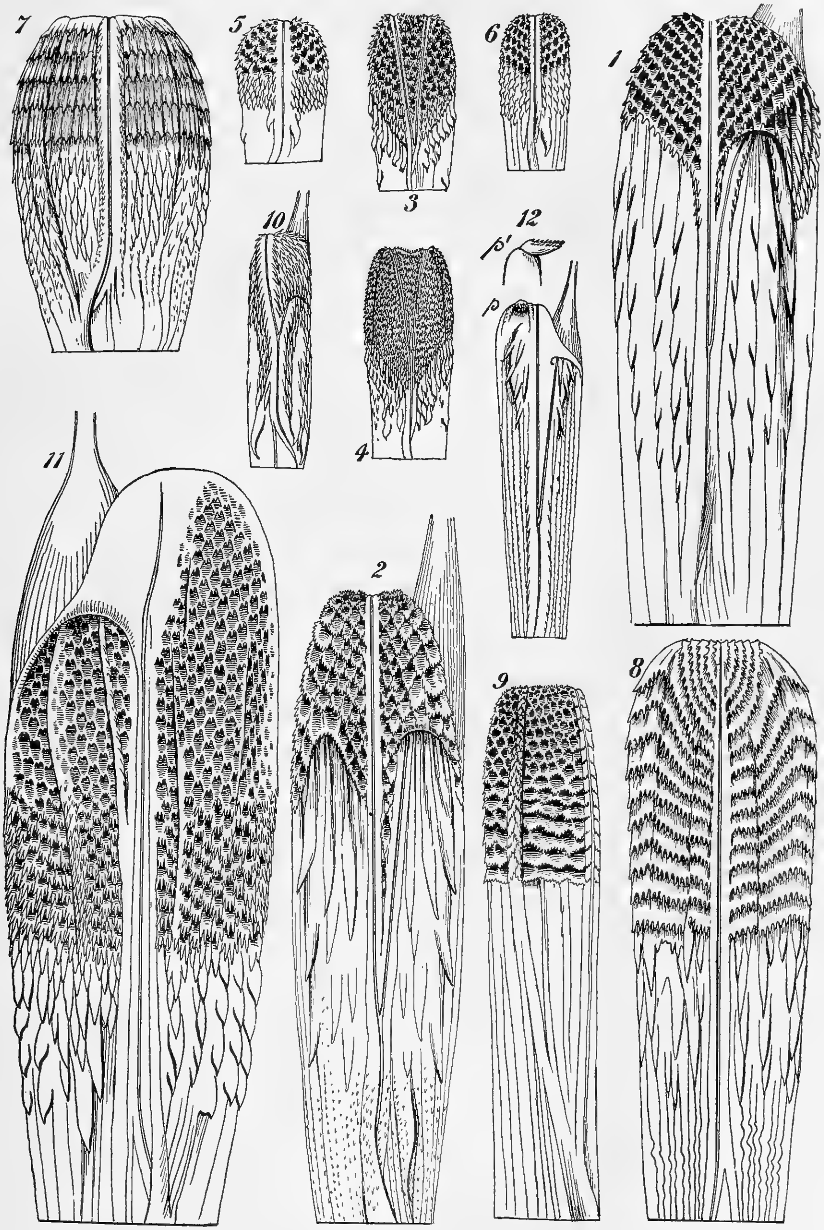
Xenodontinæ. Dromicinæ.



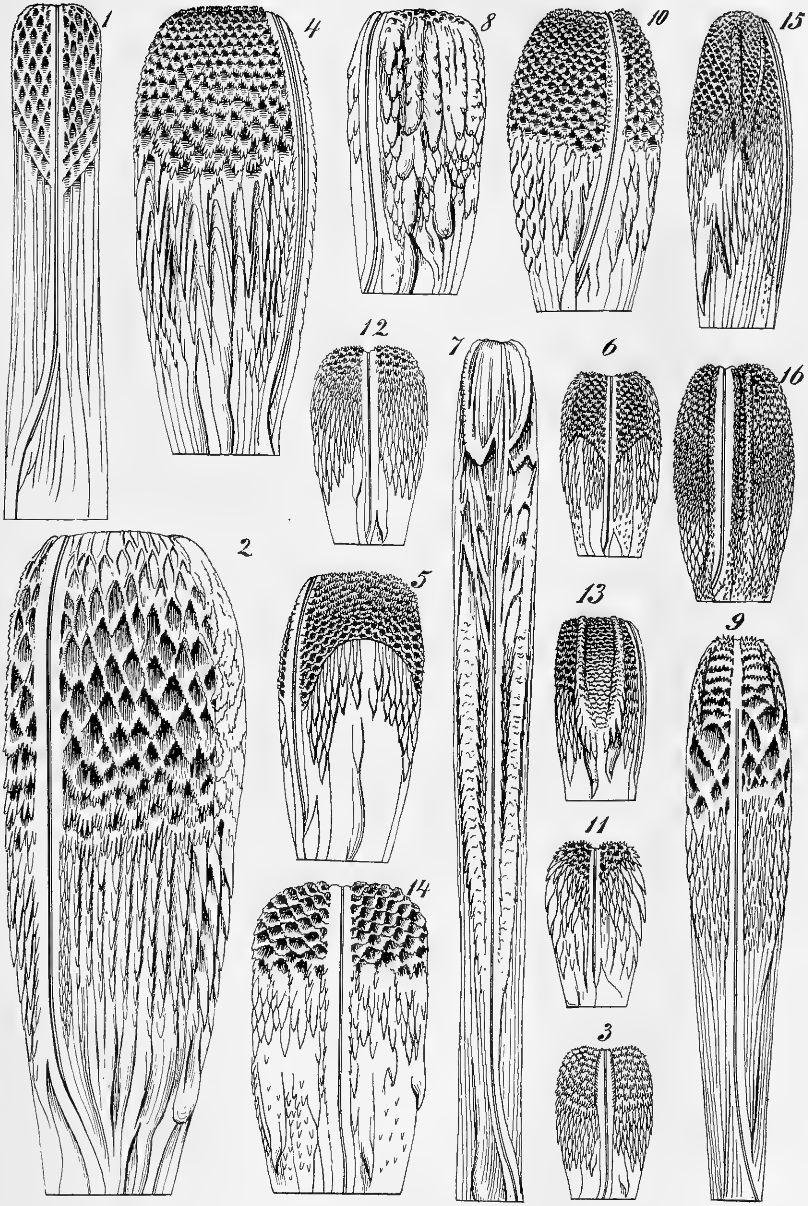
Xenodontinæ. Dromicinæ. Scytalinæ.



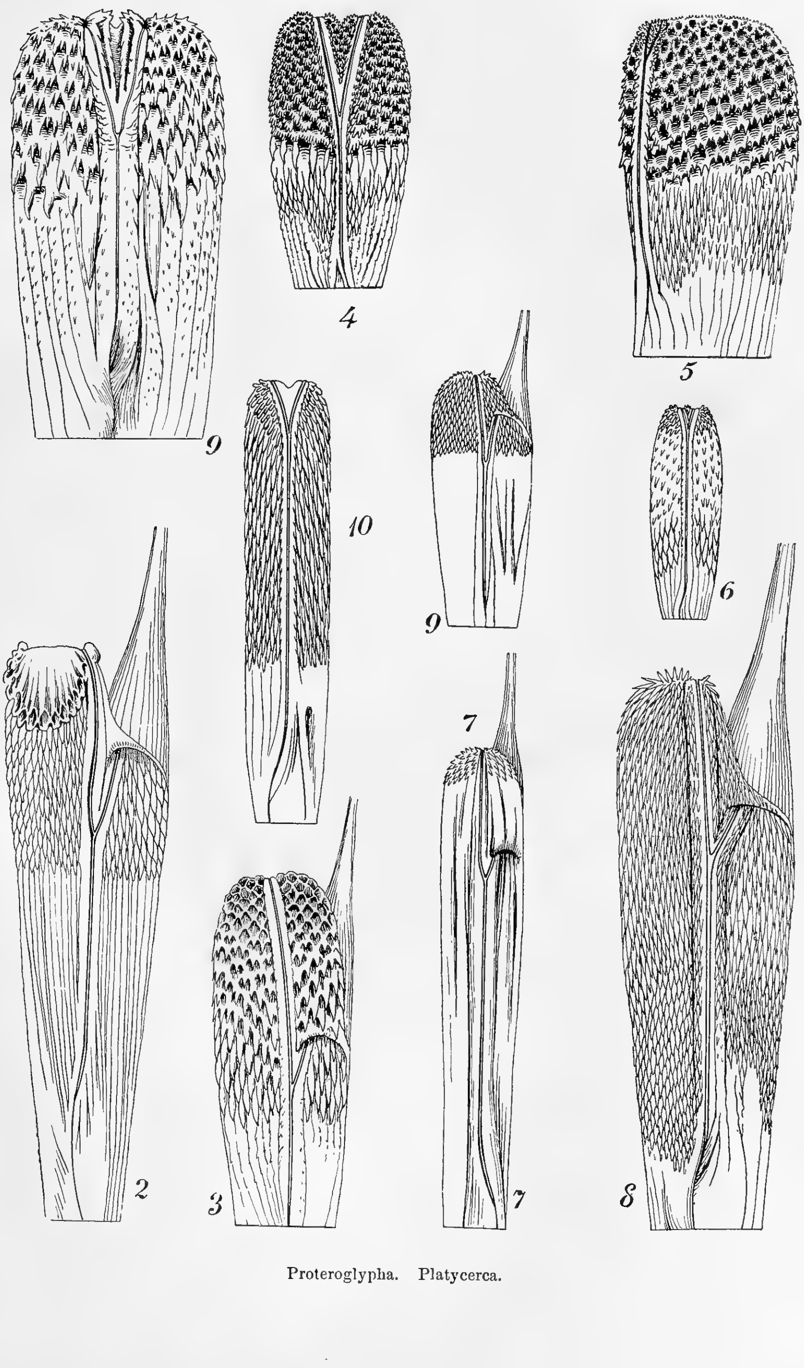
Erythrolamprinæ. Scytalinæ.



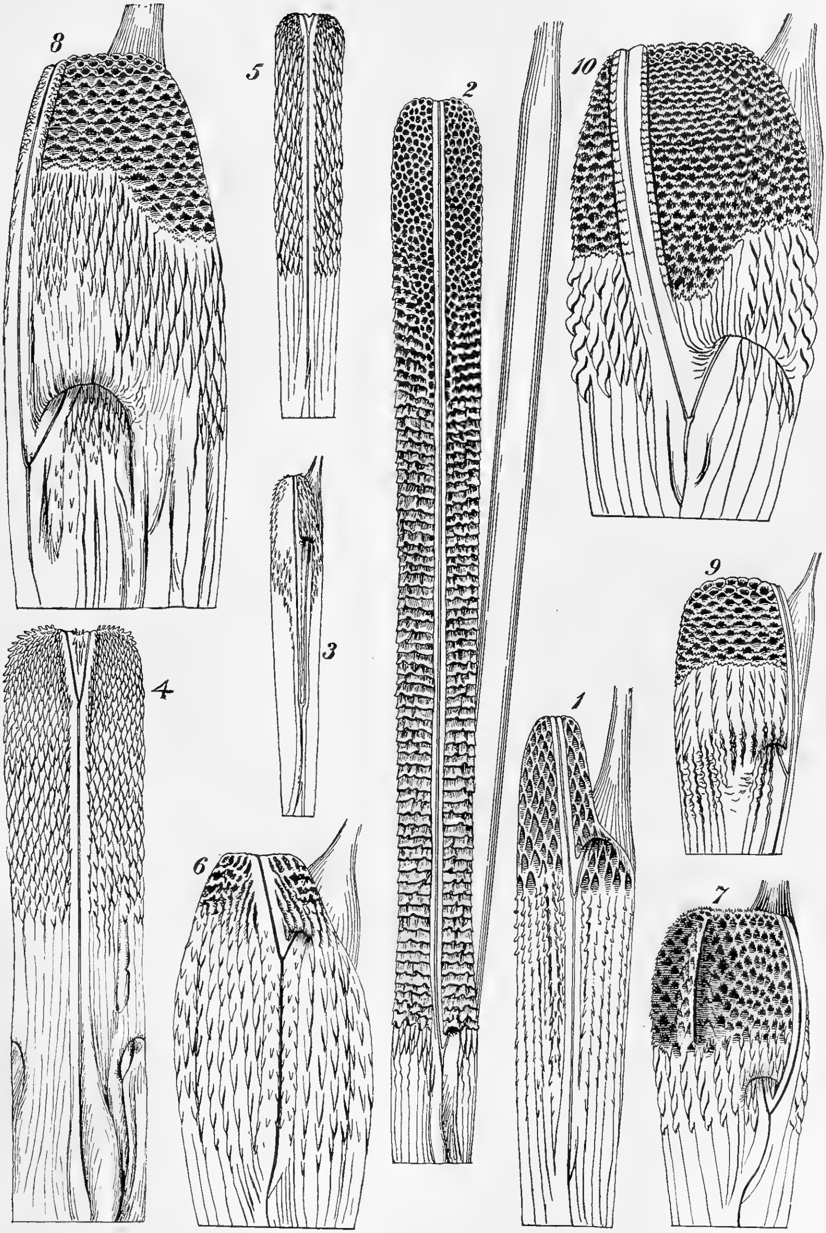
Dromicinæ. Leptognathinæ. Dipsadinæ. Erythrolamprinæ.



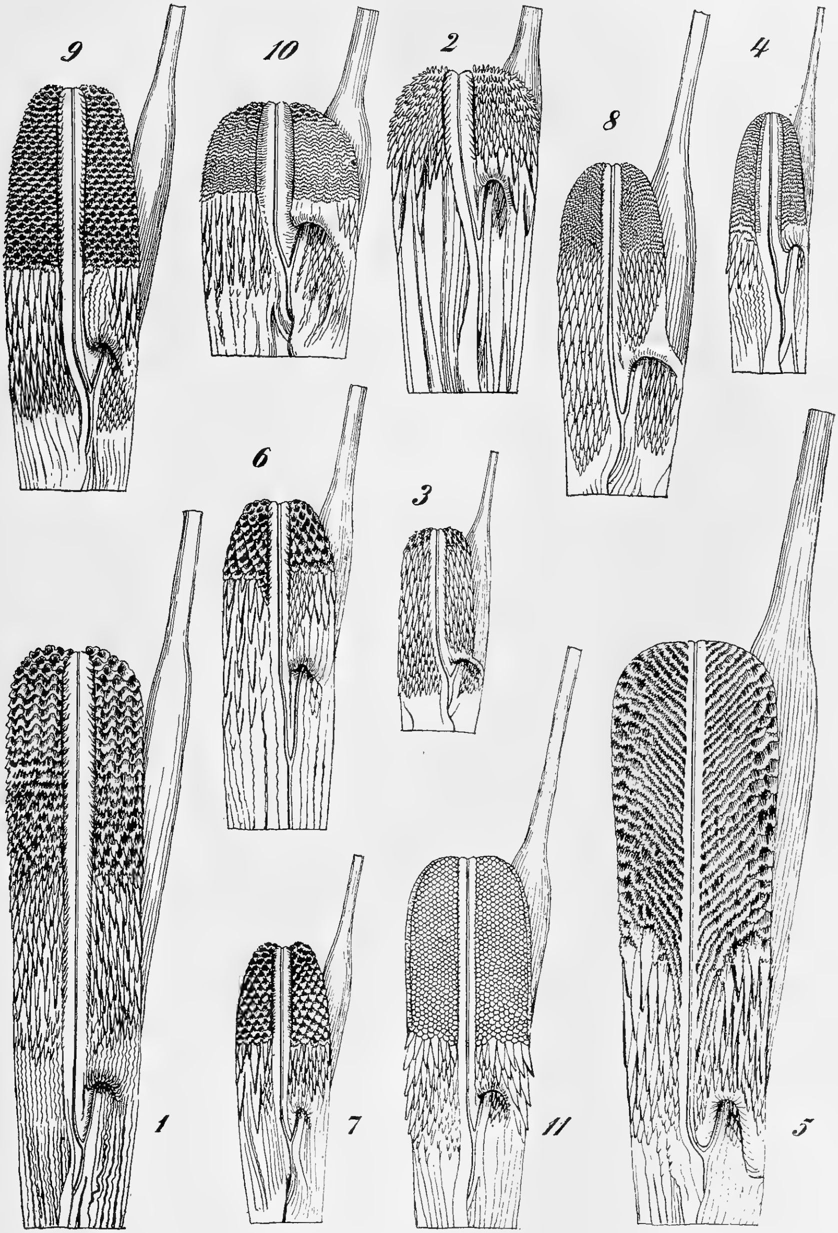
Dipsadinæ.



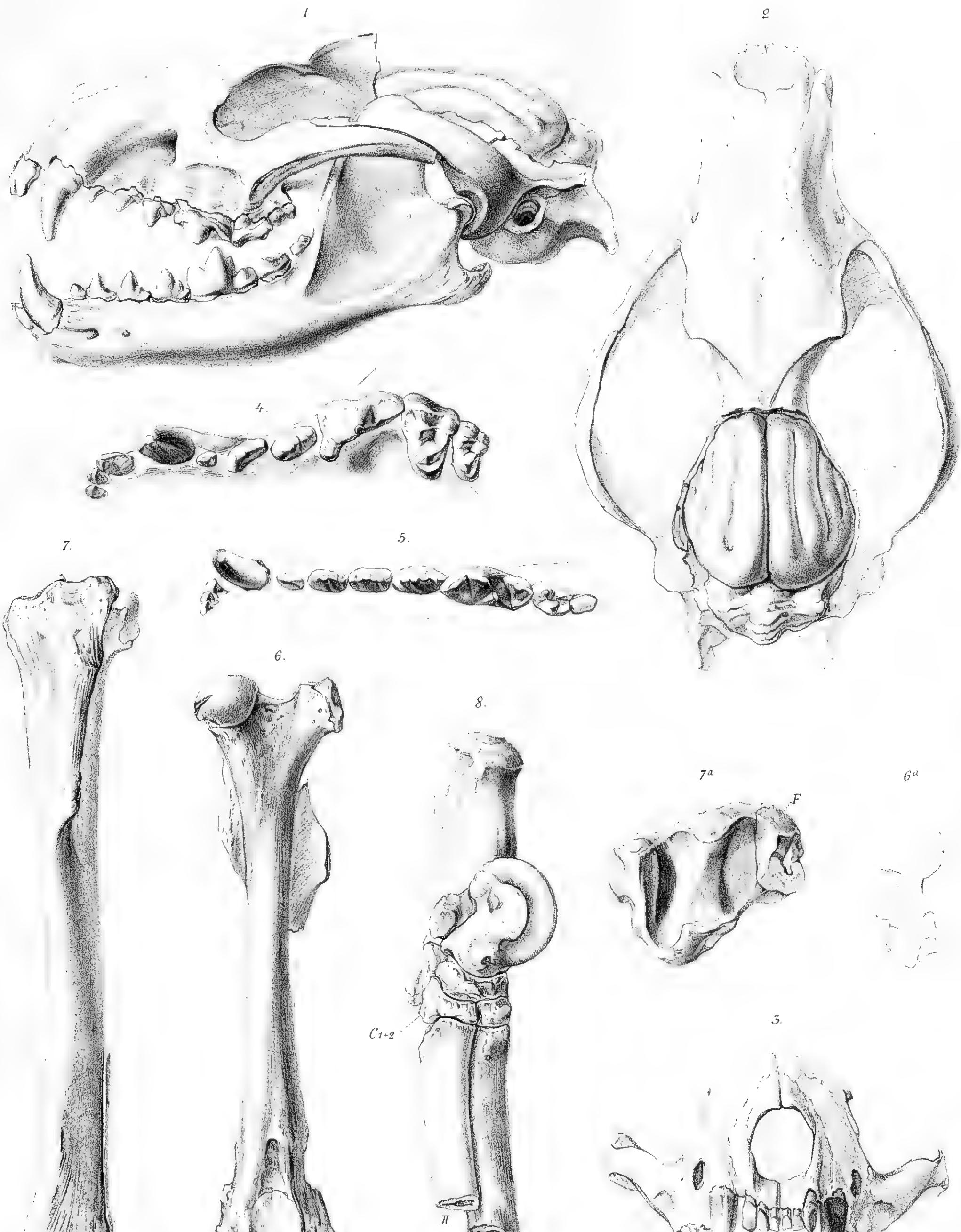
Proteroglypha. Platycerca.



Proteroglypha. Platycerca. Solenoglypha.



Solenoglypha.



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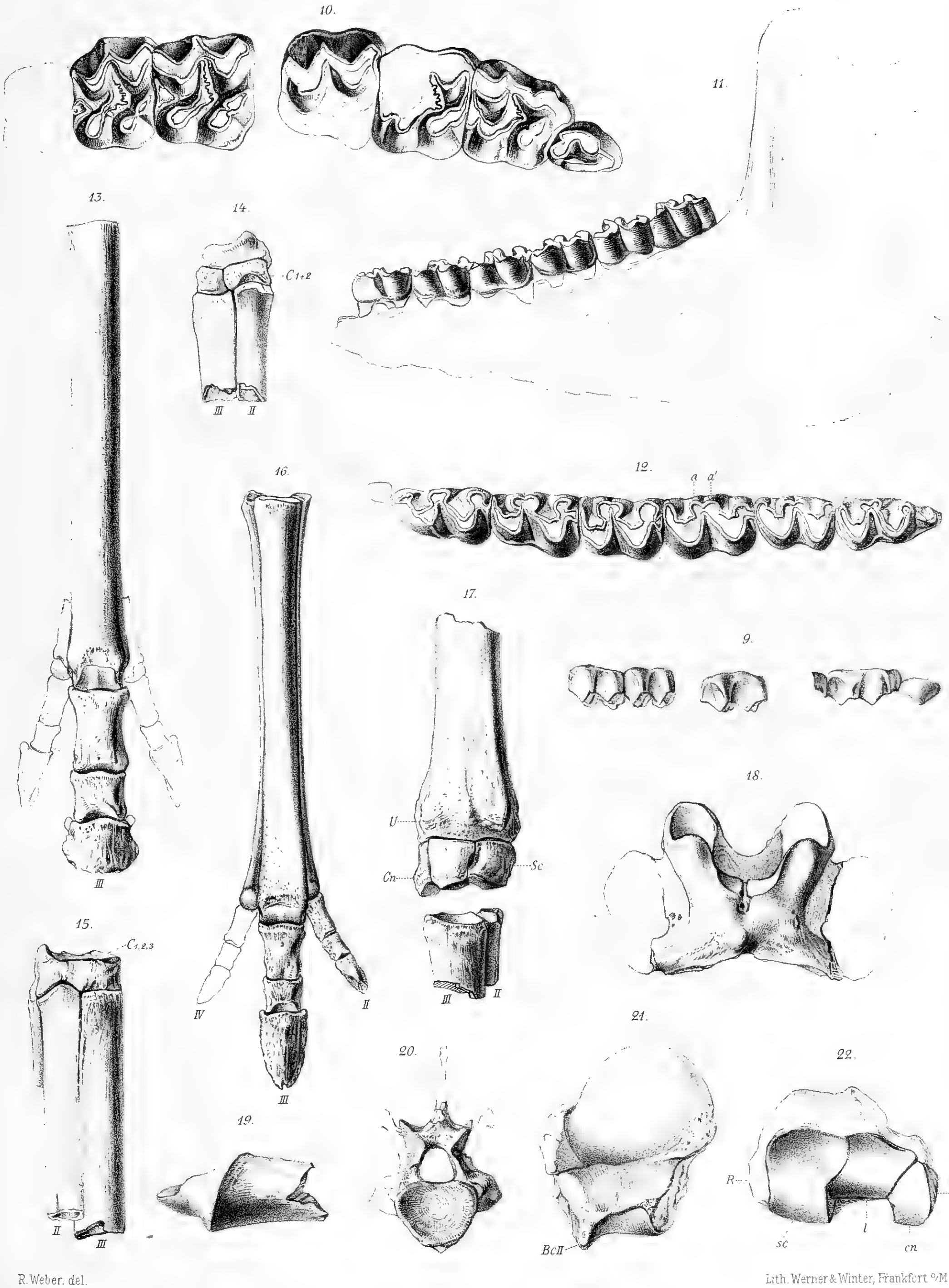
Lith Werner & Winter, Frankfort a/M.

Scott on Deep River Mammals



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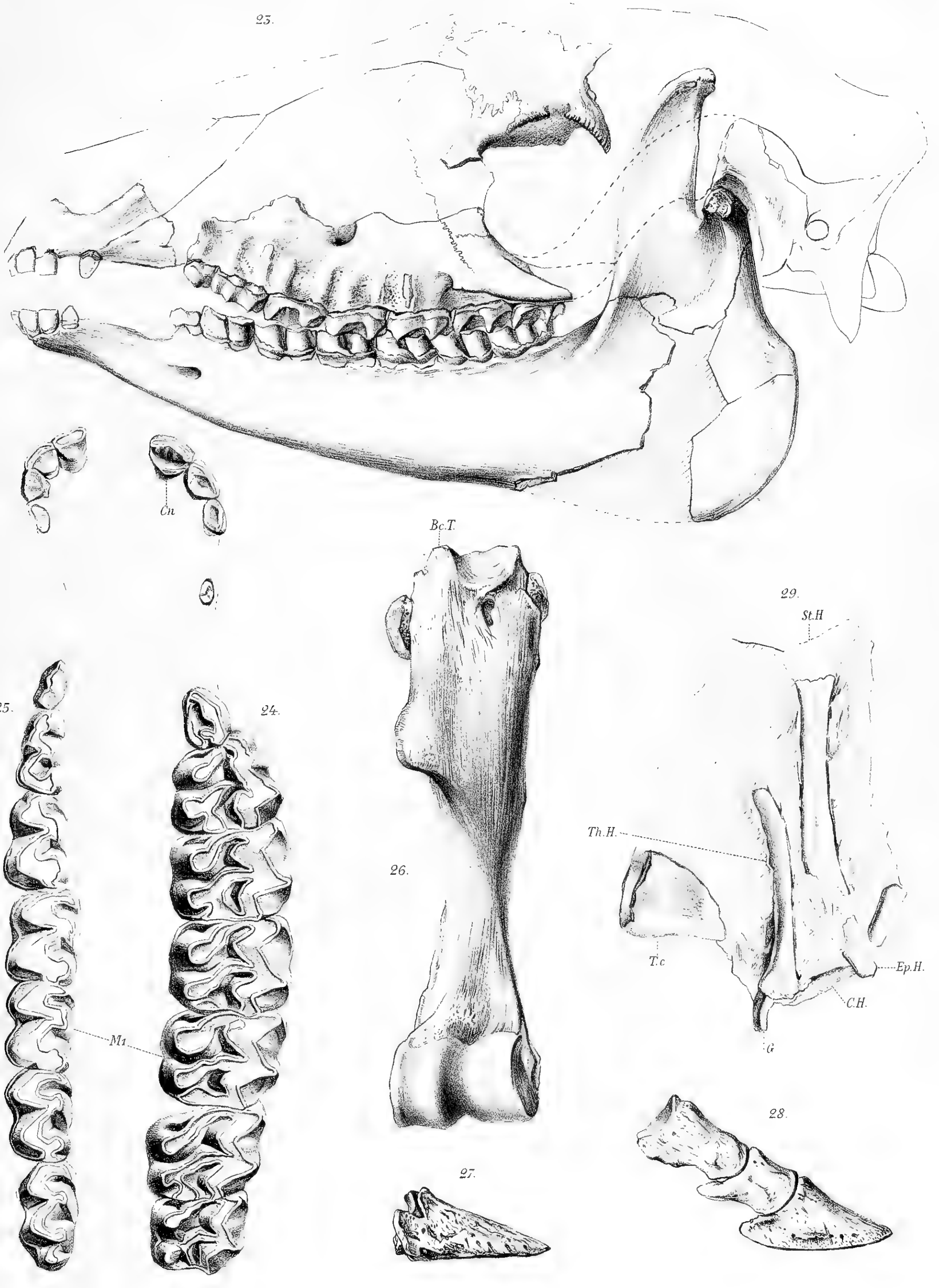

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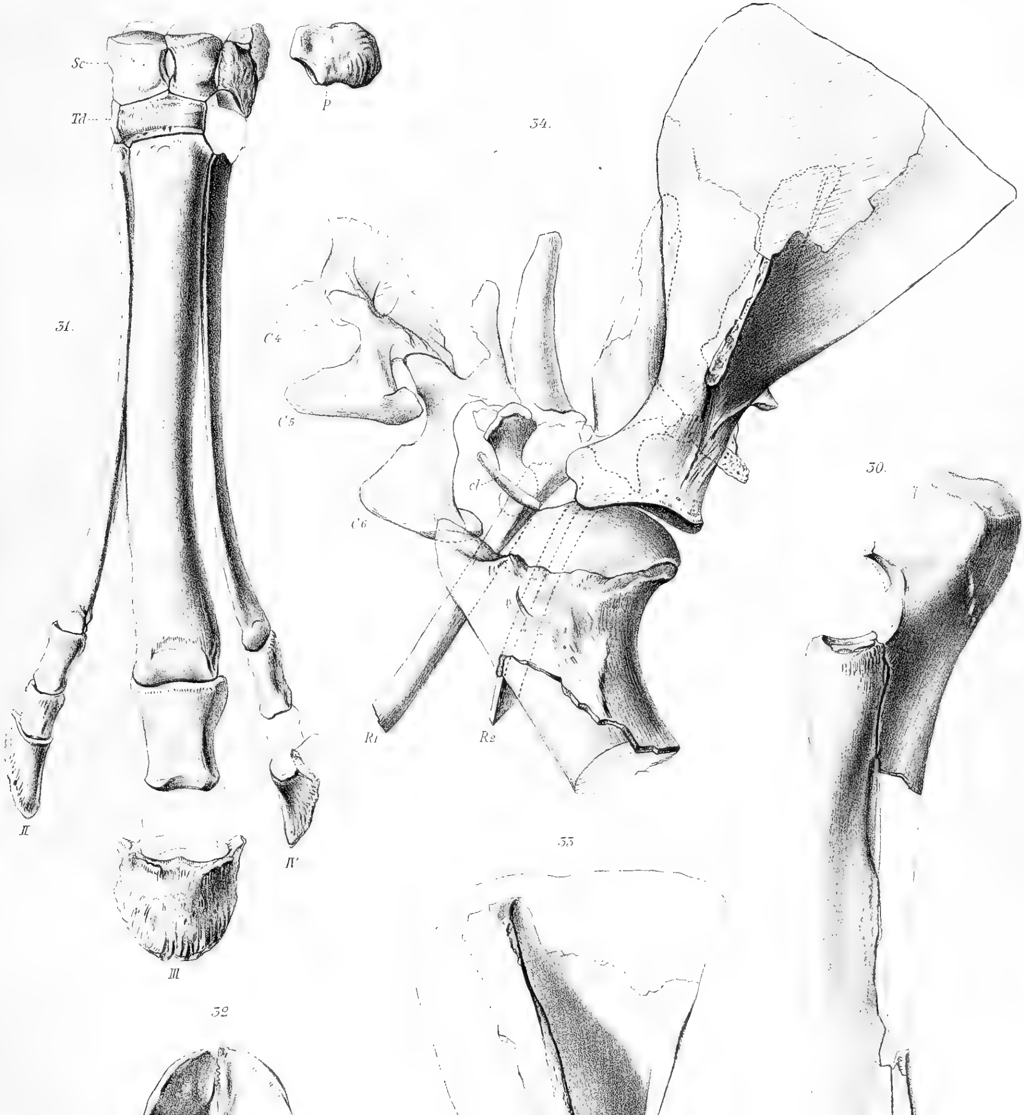

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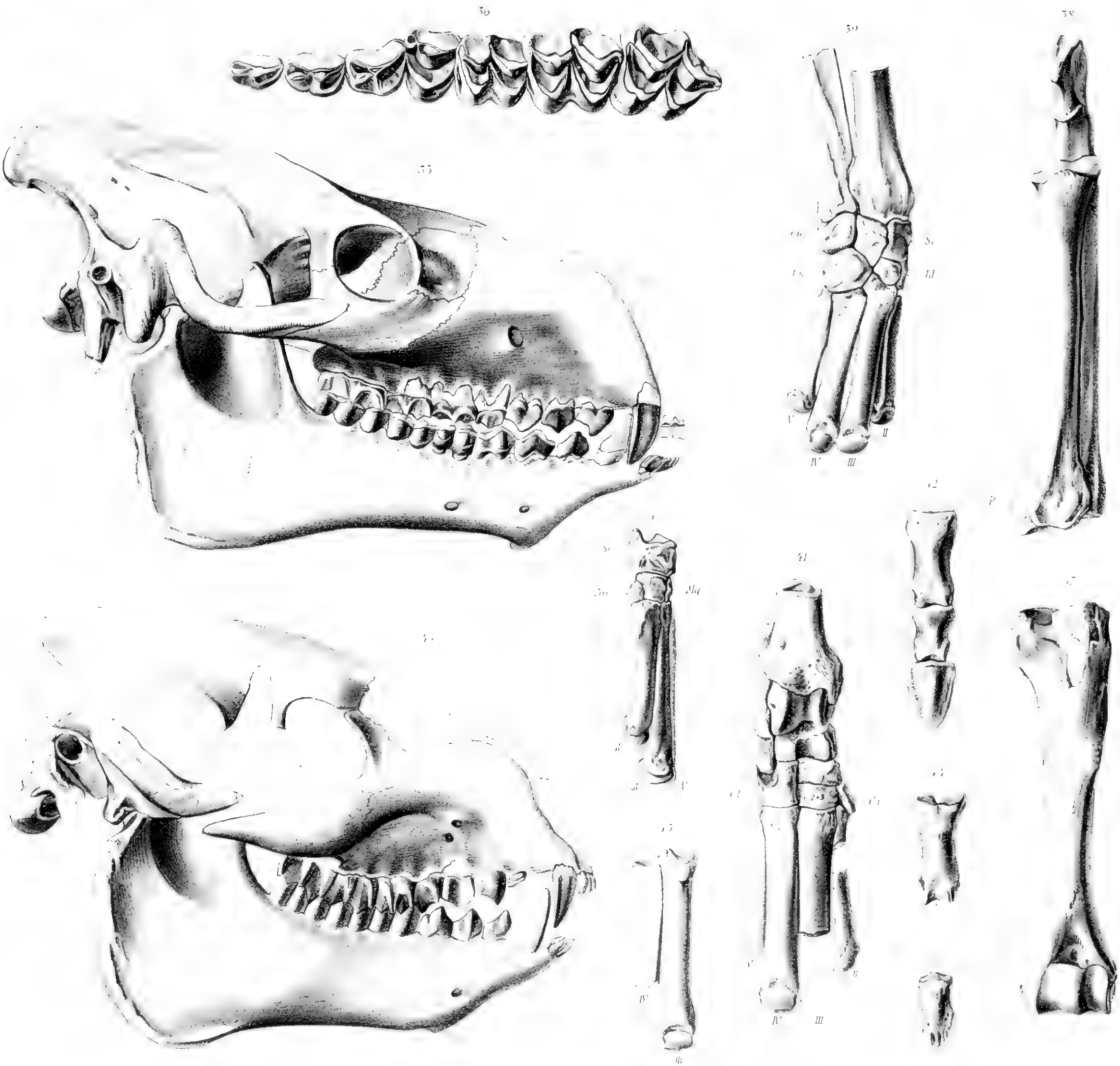

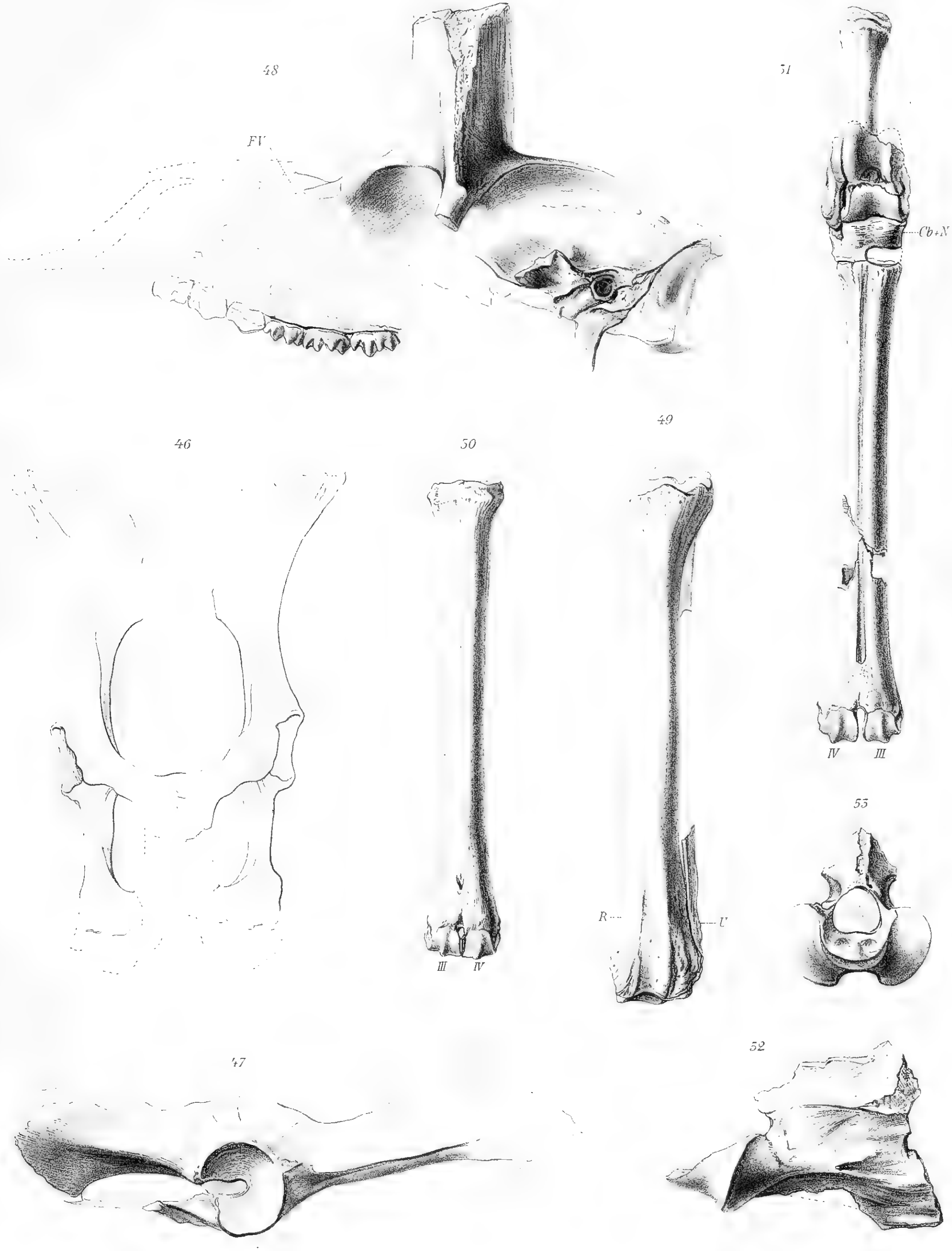

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N. TRÜBNER & CO., 57 and 59 LUDGATE HILL, LONDON.

1893.

EXTRACT FROM THE LAWS.

THE HENRY M. PHILLIPS' PRIZE ESSAY FUND.

Miss Emily Phillips, of Philadelphia, a sister of Hon. Henry M. Phillips, deceased, presented to the American Philosophical Society, held at Philadelphia for Promoting Useful Knowledge, on October 5, 1888, the sum of five thousand dollars for the establishment and endowment of a Prize Fund, in memory of her deceased brother, who was an honored member of the Society. The Society, at a stated meeting, held October 5, 1888, accepted the gift and agreed to make suitable rules and regulations to carry out the wishes of the donor, and to discharge the duties confided to it. In furtherance whereof, the following rules and regulations were adopted by the Society at a stated meeting held on the seventh day of December, A.D. 1888.

First. The Prize Endowment Fund shall be called the "Henry M. Phillips' Prize Essay Fund."

Second. The money constituting the Endowment Fund, viz., five thousand dollars, shall be invested by the Society in such securities as may be recognized by the laws of Pennsylvania as proper for the investment of trust funds, and the evidences of such investment shall be made in the name of the Society as Trustee of the Henry M. Phillips' Prize Essay Fund.

Third. The income arising from such investment shall be appropriated as follows:

(*a*) To making public advertisement of the prize and the sum or amount in United States gold coin, and the terms on which it shall be awarded.

(*b*) To the payment of such prize or prizes as may from time to time be awarded by the Society for the best essay of real merit on the Science and Philosophy of Jurisprudence, and to the preparation of the certificate to be granted to the author of any successful essay.

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