to facilitate quick readings without moving the head. The box serves as a water-bath in which any objective from one-half to one-tenth may be immersed without serious loss to the objective's optical capacity. The critical point of the fluid may be readily determined in ten minutes by both the disappearance and reappearance of the bubble within a twentieth of a degree. For further details the author referred to his earlier paper upon an apparatus for this purpose.

Dr. Theobald Smith presented an account of Salmon's culture-tubes; but as it has not yet been revised by Dr. Salmon, we postpone notice of it.

Prof. Henry F. Osborn's paper upon a microscopic method of studying the amphibian brain was valuable. The brain is hardened in 'Müller's fluid,' the ventricles being fully injected. After the usual alcoholic treatment, the brain is placed for one week in a carmine solution, then for twenty-four hours in acetic acid. The embedding mass is prepared by shaking the contents of an egg with three drops of glycerine. After soaking in this mass, the brain is placed in position, and hardened in the vapor of boiling eighty-per-cent alcohol. The mass is then placed for one week in absolute alcohol. Section is made under alcohol with a Jung's microtome. The sections on the slide are arranged, covered with old-fashioned blotting-paper (cigarette-paper was suggested as better by Dr. C. S. Minot), and treated with alcohol and oil of cloves through the paper, a device which may prove convenient in many cases.

Dr. H. G. Beyer reported one of his observations made during his still uncompleted researches on Lingula. In his abstract he says, "One of the points that I should like to demonstrate from one of my sections is a probable communication of the so-called segmental tubes with one of the diverticula (liver) of the alimentary canal of the animal, by means of a convoluted tubule;" certainly an important observation if verified.

Dr. R. H. Ward described a couple of neat contrivances, — one, a new illuminating arrangement called the iris illuminator; the other, a long-armed lens-holder. Prof. William A. Rogers gave a description of the various steps by which a centimetre or an inch may be produced from a standard metre or a standard yard respectively.

The remaining papers contained almost no new original matter, but were chiefly accounts of methods or apparatus well known to professional workers.

PROCEEDINGS OF THE SECTION OF ANTHROPOLOGY.

THURSDAY forenoon was occupied by the general meeting, leaving only time for the organization of the sections. In the afternoon the address of the vice-president, Prof. E. S. Morse, was delivered to a very attentive and interested audience. As we have already given this address in abstract, no analysis need be added here.

The real work of the section began on Friday morning, with a paper by Rev. S. D. Peet, upon emblematic mounds, their uses and purposes. The author, having carefully studied many of the mounds, has reached the conclusion that from them much may be learned as to the symbolism of the people who made them, and through this of the people themselves. He thinks that certain animal forms were used for specific localities. For example, turtle mounds were placed upon high ground where a lookout would be stationed; eagle mounds, near bluffs; panther mounds stood guard over village sites. He believes that the mounds indicate the totems of the tribe which made them. The paper was illustrated by charts, and was followed by an extended discussion. Many of the archeologists present were evidently unable to identify some of Mr. Peet's mounds, as represented in his diagrams, with known animals, so confidently as he did; and some of the outlines seemed quite unlike those of any animal, though of most the animal form was evident. The discussion soon turned upon symbolism in general. Mr. La Fléche, an Omaha Indian, and member of the section, spoke of some of the symbols common among his people. Dr. Syle of China referred to similar symbols common among the Japanese and Chinese, and noticed the very remarkable resemblance which existed between current symbols in eastern Asia and western America. Dr. E. B. Tylor spoke of the totem system as wide spread, being found not only in North America, but as well in South America, Micronesia, and among the hill tribes of India.

Then came a paper by Miss A. C. Fletcher, upon child-life among the Omahas. It was such an account as only one who had lived among the people, and with hearty sympathy entered into their daily lives, could have given; and the earnest, clear, tender treatment of the subject was most delightful. We were told how, when ten days old, the child received a sacred name given with impressive ceremonies; how its cradle was prepared, and how lovingly the little one was tended, often by father as well as mother. This cradle is a flat board, to which the child, laid on its back, is swathed; the bandages for girls being different from those used for boys. Because of this treatment, most Indians exhibit a peculiar flattening of the occiput. The child is not kept constantly on the board, but at times is allowed to kick about at will; and after the sixth month it is rarely used, a hammock then taking its place. The crying of the child seems very unpleasant to them, and if it occur they use every means to quiet it. When the child is three years old, the solemn ceremony of cutting its hair generally takes place, though all the children do not receive this. Before this, the hair is allowed to grow. At this time, if the parents desire, a new name may be given to the child. Each gens has its own style according to which the hair is cut. The home life of Omaha children was shown to be pleasant and joyous, and the child is very much attached to it. Toys, games, and story-telling abound. After early childhood has passed, various duties are assigned to the children, — to the boys, the care of the ponies, the use of the bow and arrow, etc.; to the girls, the care of younger children, and later tilling the ground, dressing skins, and cooking, and until a girl is profi-

cient in all these things she is not regarded as fit for marriage, which occurs when she is about twenty. At the conclusion of the paper, which Dr. Tylor called 'most tantalizing,' many questions were asked, and in response to these many additional facts were given. That great respect for woman prevailed among the Omahas, was emphatically asserted by Miss Fletcher. Articles of taboo were common; each gens having a certain group of objects which must not, on any account, be touched. Dreams play a very important part in an Indian's life: to him, dreams are as real as any part of the actual world about him. Mrs. Smith spoke of a custom among the Iroquois, of placing near the mouth of the dead baby when buried a cloth saturated with the mother's milk. Friday afternoon's reading began with a paper by Miss F. E. Babbitt, describing certain very rude quartz objects found *in situ* in undisturbed gravel-banks in central Minnesota. Dr. Abbott, in connection with this paper, described and exhibited some of the objects found by him in the Trenton gravels. In the next paper, Rev. S. D. Peet endeavored to show the importance of a study of the architecture of prehistoric nations as a means of discovering their degree of civilization, and subdividing the stages of progress.

A much-neglected and yet not unimportant department of ethnology was brought before the section in a paper by Mr. A. W. Butler, on local weather-lore, in which he presented a collection of sayings respecting the weather, current in southern Indiana, excluding all that are of more wide-spread use. The last paper of the afternoon, by Mr. A. E. Douglass, described in a very complete manner some of the mounds of the Atlantic coast of Florida which the author had explored. Both shell and earth mounds are found quite evenly distributed along the coast from the mouth of the St. John's River to the southern part of Lake North. The shell mounds are for the most part situated upon narrow strips of land which separate the numerous lagoons from the sea. Some are of great size: one shell ridge is eight miles long; and one mound, which covered three acres, was made up entirely of the little shells of Donax variabilis. These large mounds were constructed at different times. The earth mounds occur inland. Two of the mounds are composed wholly of bits of rock; and one large mound has, three feet below the surface, a pavement of stone which extends entirely across it. Implements and other objects are often found in the mounds of the St. John's River, but not in the more southern mounds. Mr. Douglass's account was quite detailed, and a very interesting and valuable addition to our knowledge of the subject.

On Monday morning the section first listened to a paper by Mrs. Erminnie A. Smith, on disputed points concerning Iroquois pronouns. She spoke of the peculiar difficulties which arose from the manner in which the pronouns were used in Iroquois, — some of them being arbitrarily used; different words sometimes requiring unlike pronouns for the same person and number; and there were other peculiarities which had misled students of the language. Another difficulty and source of error was found in the use of gender. The early writers recognized but two genders, a noble and an ignoble; while the author had found three, as in English. Some of the pronouns, as that of the third person, answering to our 'he, she, it,' are always incorporated; while others, as indeterminate pronouns, are always expressed independently. The grammar of Père Marcoux was criticised by the author, and certain errors pointed out. Dr. Tylor remarked, in connection with this paper, upon the importance of studying the treatment of gender in any savage language with great care. Not all peoples recognize the division of living or other objects into male, female, and neuter. The Zulus have many classes, or genera, into one or another of which any given object falls; but they do not make any distinction of male and female. Miss Fletcher said that among the Sioux the same pronoun was used for both sexes, the gender being determined by the context.

A very long and extremely interesting account was then given by Mr. F. W. Putnam, of the explorations which he and Dr. Metz had carried on under the auspices of the Peabody museum at Cambridge. These investigations had been chiefly devoted to the study of a group of mounds near Madisonville, Ind., known as the Turner group. The very careful manner in which the exploration of the mounds had been carried on — the earth taken away and examined shovelful by shovelful — was shown, and the results of the work enumerated and illustrated by diagrams and photographs in great number. Neither time, labor, nor money had been spared in the prosecution of the work; and as a result one of the most remarkable series of objects ever discovered in America had been obtained, and also many new facts respecting the structure of the mounds themselves. For example, it was found that in stratified mounds the layers were always horizontal, not, as usually represented, curved. Singular ash-pits, masses of burned clay, layers of stones, and other features were mentioned and illustrated. Among the objects taken from the largest mound of the group were the following, some of them never found before in the mounds: shell beads, disks, and rings, which were obtained in thousands; cones cut from alligator-teeth; ornaments cut from plates of buffalo-horn, mica, and native copper; objects of native silver, and even gold, and meteoric iron; pearls, most of them pierced, and injured by heat (not less than fifty thousand of these were found); small stone dishes beautifully carved to represent some animal form; and last, and perhaps most important, terra-cotta figurines of exceedingly artistic form, and strangely Egyptian in character. These objects, it should be noted, are all of an ornamental character: no other sort was found in this mound. A brief paper by Miss C. A. Studley described some of the crania from this mound, and others near it.

In the next paper, Dr. P. R. Hoy showed how grooved stone axes and similar implements could be manufactured by the use of a common hammer-stone, and showed specimens that had been so made by a friend. The specimens, which Dr. Hoy asserted

were made without great labor, were certainly dangerous counterfeits, such as might readily be passed off as genuine. Mr. Putnam remarked, after Dr. Hoy had finished, that many counterfeits were now manufactured, and that they might be found in almost every large collection, and he had knowledge of one shipment of two thousand of these frauds to England.

Following this was a paper by Major Powell, on the mythology of the Wintuns, a people living in the Sacramento valley. Many curious myths collected among this people by the author were given, but an abstract of such a paper is hardly possible. A few of the beliefs of this tribe may, however, be given. They believe in three worlds, and that each has its peculiar class of inhabitants. The sky is smoke. (Other — and the majority of — Indians believe that it is ice, as snow and hail show, and rain is the same melted; while a few think it quartz crystal.) Mountains were made by the burrowing of the mole-god. Light and darkness are maiden goddesses. Rocks and other inanimate things were once living, and some rocks now live and speak; and this is the Wintun explanation of echoes. Whirlwinds are little spirits seeking water to drink. Diseases are caused by mythical animals. The 'tar baby' of the negroes of the south appears in some form in the mythology of not less than fifty tribes of Indians; and other bits of negro folk-lore are also found among the Indians, from whom the slaves must have obtained them. Dr. W. H. Dall then read a paper on the use of labrets, its title being 'The geographical distribution of labretifery.' He described labrets of different sorts, and the mode in which they were worn. The extent of the custom over the continent was also noticed, and the fact that it is less prevalent now than formerly. The great size of some of the labrets worn was mentioned.

Tuesday morning marked an epoch in the history of the section, because of the very thrilling and vivid account and exhibition of the sacred pipes of friendship used by the Omahas. The pipes themselves are held in such reverence by the Indians, that they are never allowed to leave the tribe, and those shown the audience were the first ever taken away; and the ceremonies described and illustrated had never before been presented to an audience of white men. Moreover, it was extremely interesting to hear a full-blooded Indian explaining in clear, well-chosen sentences, some of the most sacred mysteries of his tribe to an audience of anthropologists. Mr. La Fléche first described the pipes, and how they were made, — the stem of ash, seven spans long, decorated with certain feathers of the owl, woodpecker, eagle, and duck, and with hair from the breast of the rabbit, and streamers of horse-hair dyed red. The stem was painted green, and grooved by narrow straight grooves; and, when the two pipes are in place, they rest upon a wildcat-skin at one end, while the other is supported by a crotched stick, and under them are two gourd rattles which are shaken in accompaniment to the song, or chant, sung when the pipes are taken up and waved to and fro as they are during the ceremony. After Mr. La Fléche had given his paper, Miss Fletcher continued the account, showing how strong the tie of friendship formed in the presence of the pipes is, — stronger even than ties of blood; and that in their presence no anger or ill-will could have place, but all must be peace and harmony. She spoke of the miraculous power attributed to the pipes by the Indians. The stem was of ash, because that and the cedar were the two sacred trees; the ash being associated with that which is good, and the cedar with that which is bad. With deep pathos she described the ceremony which took place when the pipes were given to her to bring away, and explained that it was only because of their profound gratitude to her for securing their lands to them from the government, that this mark of their great confidence and esteem was bestowed upon her by the Omahas. No account can justly describe the character of this joint paper. It was constantly illustrated by reference to the sacred objects exhibited, and afforded those who heard it a most vivid and intensely interesting insight into the hidden mysteries of Indian life and character.

Following this was a very instructive paper by Prof. E. S. Morse, giving some of the results of extended interviews with a Korean. Many interesting facts respecting this little-known people were given. The author spoke of the great filial obedience and devotion of the sons, the secluded position of women, the system of serfs; the law forbidding all except the king from decorating the exterior of their houses, or having any other than rectangular openings for doors or windows. The bride and groom never see each other before marriage. There is a general tendency to indolence. Strangely, a horse-shoe is a sign of good luck. Their games are numerous, and some of them intricate. Many of the superstitions of the Koreans were given.

After this, Dr. Tylor spoke upon North-American races and civilization. He alluded to the wonderful resemblance of our North-American tribes to Mongolian peoples, — a resemblance suggesting at once, not an indigenous origin for the Indian tribes, but a migration from Asia across Bering Strait. The greatest objection to this view is found in the very great diversity in the languages of the American nations. This leads to an examination of the evidences of the antiquity of man upon this continent; for, unless we can prove an antiquity sufficiently remote to allow time for the strange diversity of tongues to have occurred, our perplexity is great. While there is this diversity of language, there is great similarity in the social condition. The matriarchal system (descent, etc., through the mother, not the father) is universally prevalent.

A most thoughtful and able paper was then read by Major Powell, on three culture periods, — savagery, barbarism, and civilization. The evolution of man was dwelt upon very earnestly by the speaker. He very emphatically, and almost indignantly, expressed his belief that man's evolution never is nor can be a struggle for existence. Man does not change with change of environment; he changes, and adapts his environment to himself. The struggle has been

removed from man to his activities. Man progresses, not by struggling for existence, but by means of his pursuit of happiness. Animals live each for itself: man cannot live for himself alone. When animals were domesticated, a great step in advance was taken. By this means, and by the introduction of agriculture, the gens was broken up, and the matriarchal system changed to a patriarchal. Another great step was taken when metallurgical processes were discovered; then civilization was reached. Owing to the lateness of the hour, Major Powell omitted a large part of his most interesting paper. Speaking, as he did, with the earnestness of intense conviction, he bore his audience from argument to argument in a masterly manner; and many warm expressions of approval were bestowed upon the author.

The opening paper on Wednesday morning, by Mrs. Erminnie Smith, discussed in a very original manner the formation of Iroquois words. She very pertinently called attention to the fact, that most students of Iroquois had contented themselves with collating lists of words, while the more thorough and useful method would involve a search for roots by analyzing words; and the author had proceeded in this way, and as a result made many curious discoveries. Certain errors in dictionaries of the language were pointed out. The Tuscarora language, she thinks, affords a key to the dialects of the other six nations. Examples illustrating the formation and origin of many words were given. The literal meaning of many words in common use is very curious: for example, tears are, literally, eye-juice; whiskey, deformed water; agony, he eats up his life; a bank is a money-farm, — the principal is the mother, and the interest the baby. Birds are often named from their note, other animals from some physical peculiarity.

Following this was a long and most instructive paper by Dr. A. Graham Bell, upon a race of deaf-mutes in North America. Mr. Bell first called attention to the increasing prevalence of deaf-mutes in the United States. He showed that the increase of deaf-mutes was very much greater relatively than that of other classes. In order to open his argument, he asked the question, 'How can we in the most scientific manner establish a race of deaf-mutes?' In answer to this question, he showed that no more efficient means for the formation of such a race could be set in action than just those which, from the best of motives, philanthropy had used and was still using for the benefit (?) of these unfortunate people. The system of secluding deaf-mutes, so that they associated only with each other; teaching them a special language, so that they learn to think, not in English, but in a language as distinct from it as French or German, and thus lose largely their use of English, and cannot express themselves well in written English, — all this he strongly deprecated. He spoke of erroneous ideas respecting the deaf and dumb, which are more or less prevalent. In the education of deaf-mutes, Mr. Bell would follow a different course from that usually pursued. He would have this class of children educated in the constant company of children who can hear and speak, not reciting in the same classes, except in map-drawing and such subjects, but in rooms by themselves, and yet mingling with other children as much as possible. He would have deaf children learn to understand what was said to them, by watching the motion of the lips. He would, so far as might properly be done, discourage intermarriage between deaf-mutes. He would have all deaf-mutes taught articulation; for, only by making the attempt, can it be known who can and who cannot speak. Professor Gordon of the Deaf-mute college in Washington spoke at some length upon the subject of Dr. Bell's paper, agreeing with the author in many important points, but disagreeing with him in others. He thought the deaf-mutes less isolated, and the danger of forming an increasing race very much less, than did Professor Bell. He also strongly advocated the use of the sign language, at least in elementary classes: when older, the vernacular may well be used.

The first paper of the afternoon was by Rev. S. D. Peet, upon tribal and clan lines recognized among the emblematic mounds. Following this was a description of a hitherto undescribed sacrificial stone at San Juan Teotihuacan, by Mr. A. W. Butler. This is five feet and a half square at the top, and six feet high, very elegantly carved, the bulk of the stone being occupied by a gigantic human head. The closing papers were by Prof. E. S. Morse, who added still further to the already great mass of information which he has given us respecting the Japanese. The first paper, on archery in Japan, gave accounts of methods of arrow release and the use of the bow, giving many interesting facts. In his second paper, on the use of the plough in Japan, Professor Horse showed some of the forms of plough seen in Japan, and the manner in which they were used.

Thus closed a meeting which all the members of the section agreed had been one of the most successful ever held. The papers were, many of them, of great weight and permanent value, and must form a part of the standard literature of American ethnology and archeology. The discussions were especially notable because of the presence of eminent English anthropologists, as Dr. Tylor, Dr. Syle, and others, who freely took part, and added their store of facts and enthusiasm. Not only were professional anthropologists greatly delighted and stimulated by the series of meetings; but the large audiences which, in spite of the very great heat, daily gathered in the room assigned to section H, showed quite conclusively that some, at least, of the papers were of general interest.

PROCEEDINGS OF THE SECTION OF ECONOMIC SCIENCE AND STATISTICS.

The section met in the hall of the Historical society of Pennsylvania, Thursday morning, Sept. 4. Gen. John Eaton, commissioner of education, was vice-president; and Charles W. Smiley of the U. S. fish-commission, secretary. On and after Monday, Hon. Lewis H. Steiner of Frederick City, Md., acted as chairman of the section, Gen. Eaton having been