tions than for the same current in stronger solutions, up to 30 per cent. This shows itself especially with thin plates, and also in the shorter time required for thick plates to reach a maximum polarization with weak currents. The greater change in temperature and the greater change in concentration of weak solutions may account for this.

For currents between 0.1 and 0.2 ampere, the polarization on the end electrodes was:—

For H_2SO_4, 1.84;

" NaCl, 1.98;

" $CuSO_4$, 0.00, with Cu electrodes, though, if the current density was too great or the time long, the anode would oxidize and become irregular. C. Fromme, in a paper, "Ueber das Maximum der galvanischen Polarisation von Platinelektroden in Schwefelsäure" (*Annalen d. Physik u. Chemie*, Band XXXIII., s. 80–126), states that the maximum polarization varies both with the concentration and the relative size of the electrodes, the extreme limits being given as 1.45 to 4.31 volts — the minimum polarization coinciding with maximum conductivity. His method for measuring polarization was somewhat similar to that used in this work. As bearing upon "the change of polarization with time," I would refer especially to the investigation of Dr. E. Root upon this subject, discussed by Professor von Helmholtz, *Wisch. Abh.*, Vol.I., page 835. These experiments by Dr. Root seem to prove clearly that the liberated ions penetrate deeply into the electrode, even when liberated upon but one side of it, as in this case. I take great pleasure in expressing here my thanks and deep obligation to Professor A. Kundt and Dr. L. Arons for their kind sympathy and direction in this work.

Using $CuSO_4$ on one side of the partition, and H_2SO_4 on the other side, careful determinations have developed the curious fact that, although there is no visible development of ions (neither Cu nor O) at the gold-leaf partition, yet the Cu does not pass through the gold-leaf with the current, but H appears on the cathode instead, provided the current density at the partition be not greater than about .2 ampere per square centimetre.

The "critical current-density" at which the ions just begin to appear visibly on a gold-leaf partition varies for different electrolytes between the limit of 5.7 amperes for 30 per cent H_2SO_4 and sensibly zero for lead acetate.

This "critical current-density" is proportioned to the conductivity of the electrolyte. It therefore also has a decided positive temperature co-efficient.

ON THE FORMATION OF ALUMINUM SULPHATE IN THE SHALES THROWN FROM COAL-MINES.

BY M. H. LOCKWOOD, ASSISTANT IN THE DEPARTMENT OF GEOLOGY AND MINERALOGY, MISSOURI STATE UNIVERSITY.

My attention was recently called to a white crystaline formation found on and between the layers of a red-colored shale that is much used for walks in Columbia, Mo., and is obtained from the old waste heaps of coal-mines in the vicinity. Upon examination I found it to consist of aluminum sulphate, which is readily soluble in water, and has an alum-like taste. Occasionally some iron sulphate is present. The question arose as to how the aluminum sulphate was formed in between, and on, the layers of the shale.

For the purpose of studying the formation, I visited the Reece mine at Henry Station, on the Wabash railroad, and there collected the following waste materials as thrown from the mine, viz., fire-clay taken from below the coal, clay-parting from a layer about six inches from the bottom of the coal seam, iron pyrites mixed with coal from spots throughout the coal seam, clay containing iron pyrites and carbonaceous matter from just above the coal, and a blue argillaceous shale from above the coal.

The waste materials thrown from the mine, and exposed to the air and moisture, go through the process of slacking or burning, and it is during this process that the aluminum sulphate is formed. I also collected specimens from the burned and from the burning heaps about the mine.

Upon examination of the fresh specimens I found that the fire-clay contained no free aluminum compound that would form aluminum sulphate after the slacking or oxidation of the heaps. The clay-parting and other specimens containing iron pyrites and carbonaceous matter, will oxidize so rapidly when exposed to the air that the mass takes fire and we have iron sulphate and sulphuric acid formed. The sulphuric acid combines with the aluminum in the shales and clays about it, forming aluminum sulphate which crystalizes on the surface.

The shale from above the coal contains some simple compound of aluminum (probably the hydrate), and a considerable quantity of free sulphur. The presence of the aluminum was shown by the cobalt-nitrate test, and, also, when some of the shale was boiled with hydrochloric acid and filtered, the solution gave a white precipitate of aluminum hydrate upon the addition of ammonium hydrate.

Some pieces of the shale contained so much free sulphur that they would burn, upon ignition, with a blue flame, giving off fumes of sulphur dioxide. When some of the powdered shale was leached with carbon dioxide, and the solution evaporated, a residue of sulphur was obtained. These tests indicate that the sulphur and aluminum thoroughly penetrate the shale. When the heaps burn the sulphur becomes highly oxidized, and combines with the aluminum, forming aluminum sulphate within the shale. Heat drives the aluminum sulphate to the surfaces, hence it will crystalize between the layers and on the surfaces of the shale.

Free sulphur is found deposited in a crust at the top of the burning heaps. This shows that there is an excess of free sulphur in the waste materials.

The red color of the shale is due to the red oxide of iron formed when the water is driven off by the heat.

CURRENT NOTES ON ANTHROPOLOGY. — XXX.

[*Edited by D. G. Brinton, M.D., LL.D., D.Sc.*]

Prehistoric Ethnography of Northeastern Africa.

THERE are two very learned and suggestive articles in the *Beiträge zur Assyriologie*, Bd. II., Heft II., 1892, which may be combined to present the latest substantial opinions on the relations and sequence of linquistic stocks in the valley of the Nile and the lands adjacent. The one is by Franz Pastorius, on the Hamitic languages of East Africa; the other on the relations of the Semitic and Old Egyptian languages, by Fritz Hommel. In what I present on the latter theme, I have also had the advantage of a paper read before the Oriental Club of Philadelphia, by the able egyptologist, Professor W. Max Müller.

Scarcely any question in early ethnography could be more important. It touches directly on the origin of the two oldest civilizations of the world, — the Egyptian and the Babylonian. According to Hommel, the Old Egyptian of the Pyramid Texts, and the Old Babylonian (Semitic) tongues agree so closely in grammar, in sequence of words, in phonetics, and in lexicography, that their near relationship or their common origin must be admitted. Professor Müller informs me that in the Egyptian of the Rammesside epoch at least sixty per cent of the words in use were clearly Semitic. These relations are, however, distinctly not with the western Semites, but directly between the eastern Semitic (Babylonian) and the Old Egyptian. Hommel very pertinently adds that this by no means justifies the conclusion that the original home, *die ursprüngliche Heimat*, of the common stock was in the valley of the Euphrates; it might just as well have been on the Nile.

Some strength is given to the latter possibility by his comparisons of the Old Egyptian with the Berber dialects. He finds that the lexicon of these latter is Old Lybian, but that their grammar and syntax are very closely related to the Old Egyptian. There is no doubt but that the characteristic forms of the perfect and imperfect tenses were at one time common to the Berber, the Old Egyptian and the Semitic tongues. Besides these, as pointed out by Pastorius, the Hamitic (or Berber) dialects had in common with the original Semitic the personal pronouns, the feminine in *t*, and a number of minor structural elements. He is convinced that the East African Hamites (sometimes called Kushites) have been dwellers on the upper tributaries of the Nile, in Abyssinia, for many thousand years. Of their dialects,

the Somali and Galla are much the most profoundly semitized, the Saho and Afar (Danakil) much less so. All these dialects stand in close relationship to the geographical features of the country, showing that they originated on the spot. They have both influenced, and been influenced by, the Amharic (Ethiopic) Semitic stock, and to some extent by the Soudanese tongues. *Pari passu* with the language, the blood of the tribes has suffered from this intermixture.

The extreme interest of these conclusions cannot but impress all Semitic and Egyptologic students.

Fossil Human Remains in South America.

The critical scrutiny of the evidence of paleolithic man in North America, which has lately occupied considerable attention, has perhaps been pushed too far. When, as in the Ohio field, discoveries have been made which cannot be gainsaid, it is scarcely fair to prefer every conceivable explanation of them to the simplest one — that the articles were originally deposited where found.

Meanwhile, in South America, some interesting facts are communicated by Mr. Roth, of Buenos Ayres, to Professor Kollmann, and published by him in the Mittheilungen aus dem Anatomischen Institut, at Basel. Mr. Roth was the discoverer of the skull of "Pontimelo," which, by the way, he informs us is a typographical error for "Fontizuelos." This skull, together with some other human bones, was found under the carapace of a glyptodon of extinct species, and Mr. Roth argues that the man and the animal were contemporaries. He does not seem to have contemplated the possibility that men of later times may have found the carapace, and with it piously covered the remains of one of their dead. He asserts, however, that Döring, Burmeister, Ameghino, Moreno, and other leading geologists of the Argentine Republic, have acknowledged the contemporaneity of man and the glyptodon.

Roth cites a number of instances where human remains have been found in the upper Pampas formation. In 1887, he unearthed for the first time some in the middle Pampas strata; and, in the same, both he and others have found numerous pieces of pottery, an artificial shell-heap, and occasional silex points of human workmanship. He insists that there is no room for doubt that whenever the so-called "Pampeano Intermediar" was deposited, man was then living there. This time, if Ihering is right (see my note in *Science*, April 14), was in Pliocene (tertiary) days.

Professor Kollmann brings this into connection with other early finds in South America, and reaches the conclusion: "That the discoveries of ancient human remains in America prove that the various American races inhabited their continent quite as remote in time as did those of Europe and Asia, their respective localities;" which expression leads to the inference that he is a polygenist, or, else, seeks the cradle of the species outside these three continents.

The Ethnic Origin of the Jews.

In spite of the persistency of the typical Jewish physiognomy, it is proved by history that the Jews are far from a pure Semitic strain. They lived among and constantly intermarried with the Canaanites, Amorites, Philistines and true Hittites, none of whom were of Semitic blood; they bought Greek concubines, called in the Bible "pilegesh"; and, in turn, the males of many of the tribes around them, lured by the ever famous and still maintained beauty of the Jewish maidens, were quite willing to vow, "Thy people shall be my people, and thy God my God." In the Talmud these are called "proselytes of the King's table," and they were accorded honorable positions.

Such conversions by no means ceased with the destruction of Jerusalem by Titus. In the eighth century, Bulan, Prince of the Chasars, with all his people, embraced Judaism, and the repeated edicts in medieval time forbidding marriages between Christians and Jews can only be explained because such unions led the former to the faith of the latter.

At present, in all parts of the world, the prevailing anatomical type of the Jew is that of the brunette, with curly dark hair, dark eyes, often olive complexion, the skull long — dolichocephalic — the face rather narrow. This holds good for about ninety per cent of them; but nearly everywhere the remaining ten per cent — in Germany, over eleven per cent — are blondes, with light hair and eyes and round skulls — brachycephalic. In a much smaller percentage, the type is characteristically Mongolian, especially in the women, and about an equal number present negroid features. These aberrations from the ethnic type must be regarded as reversions through heredity to some of the numerous non-Semitic strains, which have, as above intimated, from time to time modified the pure current of Hebraic blood. That in spite of the number and extent of these admixtures the type has been preserved on the whole with such fidelity from the earliest Babylonian epoch, is a remarkable lesson in anthropology. An interesting discussion of the whole question by Von Luschan, Virchow and Alsberg may be found in the *Correspondenz-Blatt der Deutschen Gesellschaft für Anthropologie*, October, 1892. It effectually disposes of the absurd theory of Professor Gerland, of Strasburg, that the Semitic stock is a derivitive from the African negro — a theory which can only be explained by an anomalous degree of anti-Semitism obscuring his intellectual faculties.

NOTES AND NEWS.

A MEMBER of the Anthropological Society of Washington has placed in the hands of the treasurer of the society a sum of money to be awarded in prizes for the clearest statements of the elements that go to make up the most useful citizen of the United States, regardless of occupation. The donation has been accepted and the society has provided for the award of the following prizes during the present year (1893) under the following conditions: Two prizes will be awarded for the best essays on the subject specified above, viz.: A first prize of $150 for the best essay, and a second prize of $75 for the second best essay among those found worthy by the commissioners of award. These prizes are open to all competitors in all countries. Essays offered in competition for the prizes shall not exceed 3,000 words in length, and all essays offered shall thereby become the property of the Anthropological Society of Washington, the design being to publish the essays, at the discretion of the Board of Managers, in the official organ of the society, the *American Anthropologist*, giving due credit to the several authors. Each essay should bear a pseudonym or number, and should be accompanied by a sealed envelope bearing the same pseudonym or number, and containing the name and address of the competitor; and the identity of competitors shall not in any way be made known to the Commissioners of Award. Essays must be typewritten or printed, and must be submitted not later than November 1, 1893. While it is not proposed by the society to limit the scope of the discussion, and while each essay will be considered on its merits by the Commissioners of Award, it is suggested, in view of the character of the society and the wishes of the donor of the prize fund, that the treatment be scientific, and that the potential citizen be considered (1) from the point of view of anthropology in general, including heredity, anthropometry, viability, physiological psychology, etc.; (2) from the point of view of personal characteristics and habits, such as care of the body, mental traits, manual skill, sense training and specialization, and all-around manhood; and (3) from the ethical point of view, including self-control, humanity, domesticity, charity, prudence, energy, *esprit de corps*, patriotism, etc. The essays offered in competition for the Citizenship Prizes of the Anthropological Society of Washington will be submitted, on or about November 2, 1893, to five commissioners of award, including, it is proposed, one anthropologist, one jurist, one statesman, one educator, and one other not yet specified, all of national reputation, of whom at least one and not more than two shall be members of the society; and the award shall be made in accordance with the findings of these commissioners. Essays submitted in competition for the prizes should be delivered not later than November 1, 1893, to the secretary of the Board of Managers of the Society, Mr. Weston Flint, No. 1101 K street, N. W., Washington, D. C., to whom all correspondence relating to the prizes should be addressed.