place, but *Equisitum rogersii* is in magnificent development, and branchlets of *Walchia* everywhere in abundance.

In the Upper Permian about Charlottetown, the Carboniferous features of the formation are almost lost. *Dadoxylon*, *Tylodendron*, *Walchia*, *Palissya* and *Baeria* mingle with *Voltzia*, *Pterophyllum*, *Podozamities*, *Clathropteris*, ferns of Mesozoic type, and abundant *Equisetacæ*.

At Carleton a bressiated conglomerate contains many osseous fragments of considerable size, which in structure have a reptillian aspect.

This series of deposits appears to have closed in an important glacial period, for on its summit rests not only drift fragments, which must have come from the distant hills of New Brunswick, but a well-marked glacial moraine, now consolidated into a firm mass of conglomerate five hundred yards in length, occurs in the valley of the Mill River, reposing on the summit of the Permian and underlying the horizontal Trias.

The Trias contains no good deposits of plants, but such remains as we find are quite distinct from those of the underlying formation. Even the ubiquitous *Walchia gracilis* has disappeared and a new form taken its place. *Voltzia*, *Palissya*, *Baiera* mingle with a few inferior *Cycads*, and the accumulations of the ancient sand reefs are everywhere penetrated by the repent stems of *Equisetœ* and their peculiar bulbous nodes.

This meagre flora is but the representative of Mesozoic plant life when the district was recovering from the desolation of a great glacial period. Later deposits are entirely wanting, but the chance occurrence of a high-typed Mesozoic reptile, the *Bathygnathus borealis* (Leidy), in these early beds, clearly establishes their systemic standing. The whole of this series of deposits is exceedingly interesting as illustrating the transition of plant life from the Carboniferous to the Triassic.

NOTES ON THE WING-COLOR OF NORTH AMERICAN LOCUSTS BELONGING TO THE SUB-FAMILY ŒDIPODINÆ AND ITS SEEMING RELATION TO CLIMATIC CONDITIONS.

BY LAWRENCE BRUNER, STATE UNIVERSITY, LINCOLN, NEB.

ONE of the many features that have been noted in the study of our North American locusts during the past ten or a dozen years is the color-variation of the wings of the different species of locusts of the sub-family Œdipodinæ. As all students know who have had anything to do with these insects, some have yellow, others orange, still others red, and a very few have their wings blue. While this is true, perhaps it has not been generally noted that the presence or absence of humidity seems to have some influence upon these color-variations in the different representatives of this group that are to be met with throughout the country. That such must be the case, I think there can be no doubt. But little investigation is necessary to show that along the Atlantic slopes and even in the interior of the continent as far westward as the eastern edge of the great plains, red or orange is the characteristic color. On the plains and in other arid districts of the west and southwest the red and orange give place almost entirely to yellow. In the mountains red re appears, while at a certain elevation and under peculiar conditions blue takes the place of both. In some species we find both red- and yellow-winged individuals. There are also those in which yellow- and blue-winged individuals occur. Nor are these wing-color variations confined strictly to special genera. We find both the red and yellow appearing in species of Arphia, Hippiscus, Derotmema, Trachyrhachis, Psinidia, Lactista, Tomonotus, Dissosteira, etc.; while the blue and yellow are common to representatives of Leprus and Trimerotropis.

We find the red-winged species most common in humid regions, the yellow-winged in more or less arid regions. In the United States the blue-winged forms are found chiefly in mountainous regions just between the dry and wet conditions. At Pueblo, Colorado, *Leprus wheeleri* occurs with either blue or yellow wings. Near Ogden and Salt Lake City are found both this species and *Trimerotropis cyaneipennis*. They occur most abundantly a little below the upper shore-line of the ancient Lake Bonneville, and from that point up and down the mountain slopes for several hundreds of feet. Below there are to be found yellow-winged species of Trimerotropis, above red-winged Arphias. Blue-winged locusts are also to be met with on the lava beds of the Snake River Plains, on the alkali flats of portions of Montana, Wyoming, Nevada, and California, and in the Coast Range of mountains in southern and Lower California.

This same variation in wing-color among the representatives of the sub-family was also observed in Mexico, where the writer had an opportunity of visiting a number of different regions from which specimens were secured. The dry interior contained most yellow-winged and the humid "tierra calientes" furnished most red-winged species; while the midway mountain regions were the characteristic home for a blue-winged locust.

The following species are found with both red and yellow wings, viz.; *Hippiscus tuberculatus*, the prevailing color red, but in the Big Horn Mountains of Wyoming yellow-winged specimens are not uncommon. *Hippiscus*, here in Nebraska, seems to furnish about an equal number of specimens of each color. A couple of others of the genus are know to have the same wing-variations. *Psinidia sucerata* in the East is normally red-winged, but in the West is yellow-winged. Two of our Arphias, at least, have either red or yellow wings, while *Trachyrhachis pardalina* may be either the one or the other — the red being most common eastward and the yellow-winged westward upon the plains, and red again in the Sierra Nevadas.

So characteristic does this variation in color of the hind wings of these insects appear, that I have about come to the conclusion that an examination of a fair representative collection of these insects would be a sufficient index of the climate of the region from where they came. Possibly I may be wrong. If so, I would be pleased to hear the views of others who have made this feature more of a study than I have.

CURRENT NOTES ON ANTHROPOLOGY.—XXIV.

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

The Problem of Life.

"LE Probléme de la Vie" — such is the title of the latest work of that thoughtful and learned writer, the Marquis de Nadaillac. The great and serious theme he has chosen is handled with a masterful acquaintance with facts and a severely critical spirit. The sweep of his horizon is most extended. He begins with a statement of the possible methods of formation of the terrestrial globe, the first appearance of organic life upon it, and the succession of animal and vegetable organisms which have one after another occupied its surface, down to the beginning of the quaternary period. These questions fill about one-half of the three hundred pages of the volume. The remainder is an anthropologic study. The antiquity of man, the growth of his physical powers and intellectual faculties, and his identity throughout all ages, are the points which receive especial consideration.

The results of this long and patient research are unfortunately negative. "We must resign ourselves to the avowal that science can teach us nothing either about the first appearance of organized beings on the earth, or about their succession in time, or their rapid multiplication in space" (p. 176). "I look as vainly down the vista of the unmeasured past as I do in the present for any positive evidence of the evolution of organisms or the transformation of species" (p. 178). "As far as we wander, as widely as we search, everywhere the individuals of each species reveal the same uniformity of action, the same psychical fixity." Man alone shows the power of indefinite progress. "Before such facts, who will pretend that man and beast ever sprang from one common ancestry?"

Such is the author's conclusion.

The Early Iron Age in Central Europe.

With the general employment of iron, a new era arose in central Europe, one which gave birth to that high culture which has since focussed there the civilization of the world. An intense

interest, therefore, surrounds this remote period. History is silent about it, and archæology alone can guide us. This wondrous science reveals two diverse civilizations in that area during the early iron age, separated probably rather by a few hundred years of time than by a few hundred miles of space.

The first is represented by the remarkable cemetery of Hallstatt, near Salzburg. This locality discloses a people skilled in working bronze, gold, and iron, manufacturers of richly decorated and gracefully formed pottery, lovers of ornaments of amber, glass, and agate, and accustomed to cremate their dead. We may place them 500–800 B.C.

The late iron age is the La Téne period, one or two centuries before the Christian era, deriving its name from a station in western Switzerland. By that time the working of iron had reached a singular perfection; glass, gold, silver, and precious stones were frequent; the dead were buried in stone coffins, and a local coinage was for the first time issued in metallic pieces, now popularly known by the name "rainbow-keys."

Recent studies on this period are those of Dr. Jakob Heierli of Zurich, in the December number of the Proceedings of the Vienna Anthropological Society, who describes a La Téne station in eastern Switzerland; one by Dr. L. Niederle, in the Report of the International Congress of Pre-History at Moscow, discussing the age of iron in Bohemia; and an address by Von Troltsch before the German Anthropological Society with reference to it in southern Germany.

Enigmatical Stone Implements.

In *Science*, Jan. 6, Mr. Walter Hough describes a form of polished stone implement with grooved surfaces, and suggests that these utensils were employed in beating out fibrous bark for clothing, paper, etc. This suggestion is not improbable, and has been accepted by some curators. In the Trocadero Museum, Paris, these stones are labeled "Armatures de maillet à battre les fibres d'agave." In the University Museum, Philadelphia, one bears the label, "Pounder said to have been used in pounding the agave in making pulque." There is no doubt of the correctness of this identification. The Mexicans called these implements *amatequini*, paper beaters, from the verb *amauitequi*. Mr. Hough is also right in surmising that the Mexican paper was not made from the agave alone. Other materials were the bark of the "Cardia," a tree of the family Boraginaceæ, and palm leaves, *hojas de palma*, which Boturini says made the finest of all. An article on the *amatequini* may be found in *La Nature*, Dec. 15, 1888.

Another strange implement or ornament is the stone yokes or collars which are found in eastern Mexico. In the *Internat. Archiv für Ethnographie*, 1892, Dr. Ernst of Caracas has an interesting article on these. He believes them to be memorial tokens of great individual achievements and worn as signs of power and dignity, on certain ceremonial occasions. Mr. Strebel, who wrote an article some years ago on the same subject, entertained a similar opinion. As they are quite heavy, often weighing about sixty pounds, some have supposed they were intended to fasten the victim to the sacrificial stone, the *techcatl*. They are evidently not adapted for this, however. I would suggest that they were the stones used in the game of ball, *tlachtli*, described by the early writers, enclosing the aperture through which the ball was to be driven. Some are closed with an armature, one of which is figured by Dr. Ernst. They are to be distinguished from the stone yokes from Porto Rico.

Recent Researches in South American Ethnology.

South America offers as large an unexplored region as Africa, and one with as promising possibilities. Strange that it has not attracted more attention from adventurous travellers! One of these, M. Henri Coudreau, has accomplished three expeditions, at the instance of the French government, into the far interior of Guiana. His general results have appeared in various works, as "La France Equinoxiale," "Chez Nos Indiens," etc. Lately, his linguistic collections have been edited by the competent hand of M. Lucien Adam, in a volume forming Tome XV. of the *Bibliothéque Linguistique Américaine*, published by Maisonneuve, Paris. It contains ample and carefully prepared vocabularies of the Ouayana, Aparai, Oyampi, and Emerillon dialects The first two are shown on abundant evidence to be members of the Carib stock, while the two latter are Tupi dialects.

Ernesto Restrepo Tirado is a young and active archæologist of the Republic of Colombia, equally enthusiastic in field-work and in historical studies; as is well shown in his "Estudios sobre los Aborigenes de Colombia," the first part of which, a volume of 180 pages with a good map, was published in Bogota last year. It begins with an extraordinary list of the tribes who occupied the territory at the time of the conquest, largely drawn from the epic of Juan de Castellanos. That Mr. Restrepo had the courage to read the 110,000 verses which compose this epic is reason enough to entitle him to our profound respect. Of course, a great part of his study refers to the Chibchas, who had the highest culture of any Colombian tribes. They were, however, not the most skilful workers in gold. This honor belonged to the Quimbayas, upon whom he has written a long essay, separately published. As their wealth led to their early and complete destruction by the Spaniards, their ethnic affinity has not yet been determined.

The University of Zurich possesses the rare treasure of five skeletons of members of the Alakuluf tribe of Tierra del Fuego. It seems these wretched islanders were taken to Europe to show in museums, and by some strange fatality all died at Zurich of pneumonia. Dr. Rudolph Martin has worked up their osteology and published his results in the *Vierteljahrsschrift der Natur. Gesell.* in Zurich. He finds the skulls well shaped, mesocephalic, with relatively large cubical capacity, 1590 cubic centimetres, and the horizontal circumference greater than that of the modern Parisians, as reported by Broca. The torsion of the humerus was less than in Europeans, and two of the humeri showed perforation of the fossa of the olecranon. The study is an exact and an interesting one.

LETTERS TO THE EDITOR.

**** Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

On request in advance, one hundred copies of the number containing his communication will be furnished free to any correspondent.

The editor will be glad to publish any queries consonant with the character of the journal.

A Reply to Professor Hathaway.

I HAVE just read the note of "praise and criticism" on my books by Professor Hathaway in *Science* of Feb. 17. Kindly allow me a few words in the way of reply. Passing over the first part of his note, and thanking him for any praise of my books which he has given them, I come to what he calls his "illustration of my treatment and use of the method of infinitesimals." He says: "Thus, by trigonometry,

$$\sin(x+dx)+\cos(x+dx)=\sin x\sqrt{2}\cos\left(\frac{\pi}{4}+dx\right)$$
$$+\cos x\cos dx+\cos x\sin dx$$
$$=\sin x+\cos x+\cos x\,dx,$$

since $\sqrt{2}\cos\left(\frac{\pi}{4}+dx\right)=1$, $\cos dx=1$, $\sin dx=dx$,

Hence $d(\sin x+\cos x)=\cos x\,dx$, a false result."

Of course, it is a "false result"; who would expect anything else when the work in it is false? But this is Professor Hathaway's work; not mine. His statement, made above, that "$\sqrt{2}\cos\left(\frac{\pi}{4}+dx\right)=1$," is *not true*. For,

$\sqrt{2}\cos\left(\frac{\pi}{4}+dx\right)=1-dx$, as any mathematician can see.

Therefore, $d(\sin x+\cos x)=\cos x\,dx-\sin x\,dx$, a *true result*.

Professor Hathaway has given the above illustration, as he says, to show how I "establish the differentials of the trigonometric functions"; though I should have never known it if he hadn't told me; and I deny that I should ever have taken this roundabout way. I hope that Professor Hathaway will not give the credit of his "false result" to the infinitesimal method, which he says "is at best a dangerous one, even in the hands of the masters, let alone the average student." I think, on the contrary, that the method is a safe one, when well understood. "In the hands