lain, then president of the Board of Trade, introduced an act to enable electric lighting companies to be formed, but, at the same time, provided that city authorities might buy up their concerns at the end of twenty-one years at the mere cost of the material; while, should they not be then pleased to use their right, it should occur again at the end of every seven years. Only recently a change was made, on the discovery that the act was a direct hindrance to speculation, for in effect it meant, "We will let you run the risk when the scheme is not paying, but will take it as soon as you have made it successful." The vicious principle is still retained, but the same has been extended from 21 to 42 years. The result I need hardly tell you. You see it in the general installation of electricity throughout the metropolis, and electric principles I hardly need describe to you. The dynamo gives a continuous low tension current, using, in its simplest form, two wires for its transmission, but the three-wire system is one of the most remarkable advances. A high-tension current traverses the mains, and is transformed to low-tension when entering the houses, the saving in copper being thereby enormous, while, by a switch arrangement, we can use the current at will for lighting or for power. But you yourselves saw the largest and most interesting example of this method of distribution when you visited the Deptford generating station of the London Company.

Electric welding is another application of primary importance, using either the two plates themselves as poles, or one plate as pole, and what we might call a "soldering bit" for the other pole. This method is extensively employed at Sheffield for repairing steel castings, and with great success. When I was apprenticed, there was used for similar purposes a metal known as "Beau Monteague" (laughter), and from your faces I gather it has not been entirely forgotten. It was not a method of repairing, however, only one of deceiving. I wish I had time to tell you of present-day steel manufacture, but I will simply say that, whereas it was formerly made in pounds, it is now produced in hundreds of tons.

I am now about to extol myself. The Gifford injector caused very great interest from the first, if only because its action seemed impossible of comprehension. I was myself the first to give a complete explanation of that action without the aid of mathematics. (Hear, hear). My contention was that the whole thing might be summed up in the single word "concentration," and to show this I devised an arrangement by which a head of water left one vessel and entered another, rising almost to the same height, by simply shaping the opposite nozzles with such care as to concentrate the pressure upon the smallest possible area. A similar example is that of an armor-piercing projectile. A blunt-ended shot will be flattened still further, but a hard-pointed one will receive very little deformation in entering the plate.

To close with a few remarks on technical education. For the first eight years of its existence I was chairman of the executive committee of the City and Guilds of London Institution. I am now a vice-president, but have not time to take an active share in the management. I am glad, however, to know of the good that it is doing and of its recognition of merit in those which go up for examination. I am glad to find that, even in this very early period of the existence of your society, Mr. Walter Grant has succeeded in obtaining the bronze medal of the Institute and third position in the country for mechanical engineering, while the same student has obtained a Queen's prize in advanced machine drawing, which is granted, I am told, to only a few top men. (Loud cheers). I have some further notes placed in my hand with regard to the success of other students of Section A, from which I find that in three advanced subjects (steam, mechanics, and machine drawing) there has only been one failure in each, equivalent to 12 per cent, while the grand total of all its subjects represents a success of 82 per cent, a result of a very gratifying character, which is greatly due to the excellent instruction which Mr. Lincham has given you. (Loud and continued applause.)

A vote of thanks was next proposed by Mr. Redmayne, which was carried unanimously.

Sir Frederick briefly tendered his thanks, and the proceedings terminated.

ON THE GROWTH OF THE RATTLE OF CROTALIDÆ.

BY S. GARMAN, MUS. COMP. ZOOL., CAMBRIDGE, MASS.

SINCE the appearance of the article on "The Rattle of the Rattlesnakes" and its evolution, Bull. Mus. Comp. Zoöl., XIII., No. 10, Aug., 1888, the study of these crotalidæ has been continued with the purpose of securing rates of growth and other particulars not fully determined at the time of publication. As the final report may be delayed for a time it seems proper in this place to refer in advance to several items which have in some extent been questioned by other writers. The point to which attention is specially directed is the acquisition of new joints in the rattle. In regard to this, variations occur in the time; none have been noticed in the method. In all cases observed the growth of a new button, causing the appearance of a new ring or joint, was connected with the process of sloughing. Growth was first detected at the time of the advent of the whiteness in the eye and under the epiderm in general. This whiteness was evidence of dermal growth, which on the tail seemingly was prolonged a little after the eye had become clear or until the slough was cast. Possibly the apparent prolongation was due to a mere pushing back and hardening of the newly-grown button. The preparation for sloughing was in each instance preceded by the whitish appearance under the outer cuticle, as was stated in the above-mentioned bulletin. The milkiness, as it might be called, lasted longer on specimens kept in the shade than on others exposed to the sunshine.

A few extracts from notes on several individuals will, without further comment, suggest the results obtained.

The first case is that of a large banded rattlesnake, *Crotalus horridus*, on which the whiteness was visible on eye and button August 17. There was no mistaking the fact that the epiderm of the button was being pushed back to become a section of the looser portion of the rattle. By the 26th of the month the button was becoming darker, though the eye was still somewhat clouded and remained so until the 30th. At this date the eye was bright and clear and the new button had become dark colored and was seen to have pushed back the recent slough as the newest ring or joint of the series. It was not until September 4 that the slough was stripped from the body; it had previously separated from the new ring.

Another case is that of a prairie rattler, Massassauga, *Sistrurus catenatus*, on which the milky appearance was seen September 12. It was then but slight on either eye or button. Two days later it was very intense; by the 19th of the month it had become almost obsolete. Only about half of the new button was visible behind the small scales at that date. This snake sloughed on the 24th The newly exposed button was whitish; it became dark rapidly when placed in the sunshine.

A third case to mention is that of a snake, of the same species as the latter, kept on very short allowance of food, by which no doubt sloughing was much retarded. This one did not show the milkiness until December 11. The whiteness vanished about the 23d, and the slough was put aside on the 31st. It came off nearly entire, the exception being less than half an inch, which remained attached to the anterior edge of the newest ring.

In all cases under observation a new ring has been gained with each sloughing, whether it occurred in the fall, the winter, or the spring. The snakes are still in keeping to determine the greatest number of sloughs in a season and other points. Thus far the later studies have given very little reason indeed for modifying the conclusions published in the above-mentioned article.

CURRENT NOTES ON ANTHROPOLOGY.—XXIII.

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

The Language of Craniology.

"SPHENOCEPHALIC, tetragonic, dolicho-meso-brachycephalic, hypsicephalic, metrio-cephalic, hypo-stegobregmatic, hypsion-chobregmatic, cremnoopistocranic, chamelnogathic, euryzicic, chameprosopic, platyrrhine, chameconch, orthognathic, hyperplatopic"!!

In these few and simple words Professor Sergi, the distinguished Italian craniologist, describes a skull from Melanesia. It offers a by no means unexampled specimen of the extraordinary language which writers of that specialty have been revelling in of recent years. They seem to have swallowed the Greek dictionary, and finding its roots of difficult digestion, have regurgiated them in this unassimilable state. Let us appeal to them in the words of Horatio when he listened to the dialogue between Hamlet and Oscar:—

"Is't not possible to understand in another tongue? You will do't, sirs, really."

To make matters worse, a Greek root which satisfies a German, is for that very reason distasteful to a Frenchman. It is enough for one to say *chamaeconch*, for the other to invent *megaseme*. Even German big-wigism has at last revolted against this distressing verbosity. Professor Moritz Benedikt, of Vienna, has published an open letter appealing to craniologists to speak in some less jaw-breaking and pedantic lingo. He addresses it to Professor Sergi, and publishes it in the Proceedings of the Vienna Anthropological Society, December, 1892. May his protest have a wide circulation, and receive an attentive hearing!

Ethnography of Tribes of the Northwest Coast.

Several interesting contributions to our knowledge of the tribes of the Northwest coast have recently appeared. First may be mentioned the report on the Kootenay Indians of southeastern British Columbia, by Dr. A. F. Chamberlain, published with an introduction by Mr. Horatio Hale by the British Association for the Advancement of Science. It deals quite fully with their psychology, social organization, arts, physical characteristics, and language. In the last-mentioned respect they appear to form an independent stock. In the introduction, Mr. Hale discusses some general questions with his customary ability and fairness.

A neighboring tribe, the Shuswap of British Columbia, forms the subject of a careful paper in the Transactions of the Royal Society of Canada by Dr. George M. Dawson. He speaks of their tribal subdivisions, houses, customs, history, and mythology, and adds a long list of place-names with their significations. An excellent map is appended. He agrees with previous writers that their linguistic affiliations are with the Salish proper; but he calls attention to an ancient speech among them, now nearly extinct, apparently from some Tinné influence.

In the same Transactions, Mr. Alexander Mackenzie publishes descriptive notes on implements, weapons, and tools of native manufacture from Queen Charlotte's Island, with illustrations. In an introductory note Dr. G. M. Dawson extols the ability and dexterity of the Haida Indians, which he thinks have not been appreciated by ethnologists. He does not hesitate to claim that the incipient civilization of the Haidas "was higher than that found in any other people of the west coast of North America"; a statement which certainly requires modification.

Points in African Linguistics.

The precise relationship of the various members of the Nuba stock in equatorial Africa has recently led to some discussion in German periodicals. The Nuba stock is not negritic. The features and expression of the face, the shape of the nose, the forms of the skull, place them outside the physical characters of the true Negroes, and assimilate then in spite of their dark color to certain branches of the white race, especially the Semitic. In languages they appear to offer four independent families, one of which includes the Monbuttu, the Nyam-nyam, the Gola, and some others, the credit of defining which belongs to Dr. Friedrich Müller of Vienna, as has been shown in a late contest on the point. The intermediate physical position of this stock lends especial interest to its study.

An important warning in reference to the Bantu languages was sounded at the last meeting of the American Oriental Society by the Rev. Lewis Grout, of Vermont. He points out that the "Comparative Grammar of the South African Bantu Languages," of the Rev. J. Torrend, lately issued in London, takes as its standard the tongue of Tonga or Batonga, which is unquestionably a corrupt and mixed dialect, with many borrowed words and broken-down grammatical forms. Mr. Grout touches here upon a very important point in linguistic study. In approaching the analysis of an indigenous tongue it is extremely difficult to decide which of its dialects should be chosen as the standard — as best representing the parent stock. Yet it is most desirable, essential, indeed, to a successful analysis, that the right choice be made.

On Current Mexican Philology.

It is probable that no more independent linguistic stocks will be discovered within the area of the Republic of Mexico; but there are many within its various states of which we lack information. Within the last few years energetic efforts have been made by the Director-General of statistics, Dr. Antonio Peñafiel, to supply this deficiency. He has caused to be extensively distributed a list of nearly three hundred words to the officials and curas of parishes where the native dialects continue to be spoken, with the request that they be translated into the local idiom and returned. In this manner he has obtained a mass of new and trustworthy material which will enable linguists to classify the many obscure and little-known tongues, the names of which are preserved in the works of Orozco y Berra, Pimentel, and other writers.

It is to be regretted that these lists have not been promptly published in some cheap, accurate, and convenient form. The only instance of an issue of this *Cuestionario Filologico* which I know of is the "Vocabulario Castellano y Nahuatl," by the licentiate Cecilio A. Robelo, which was printed by his own efforts at Cuernavaca. It is very much to be commended, and to call it a vocabulary is to do it scant justice. Each word is traced to its radical, its special uses and synonyms are discussed, and its various significations are explained. If all the *cuestionarios* are filled on this model, American philology will be enriched, indeed, by our Mexican friends.

The Tale Told by the Teeth.

The development of the molar teeth of the human jaw is a history which is claimed to reveal some interesting points in the genealogy of man and the relationship of races. It is now some five years since Professor Cope urged the opinion that the tubercular forms usual in the cusps of human molars point to a reversion to the type of dentition prevailing among the lemurs, and the inference was near at hand that in the discussion of the evolution of the genus *Homo* we had better look toward a lemurian rather than a simian progenitor.

His statements were studied closely by several German writers, and also by Dr. H. F. Osborn of Columbia College, who, in a recent number of the *Anatomischer Anzeiger* (No 24, 1892), presents a summary of results, some of the weightiest taken from his own researches. He shows that the primitive form of the mammalian molar was a single cone, to which all the other cusps have been successively added. Four, five, or six cusps, and various intermediate tubercles, appear on the molars of some of the primates. The tubercles of the human molar may be considered a reversion to the lemurine type, and Dr. Osborn maintains that in comparison the quadritubercular form was a comparatively recent acquisition compared to the tritubercular.

The attempted application of these traits to racial anatomy cannot be said to have resulted in anything definite. It may vaguely be affirmed that in the molars of the lower jaw, which are the more distinctive of the two, four cusps are more frequent in the "higher" and five in the "lower" races. This is the opinion of Dr. Topinard in his latest writings on the subject. He seems to have little respect for the lemurian theory, referring to these as "animaux de transition discordante, à type non arrêté."

Professor Topinard has taken up the subject with his usual thoroughness in an article seventy pages in length in *L'Anthropologie*, December, 1892, entitled "De l'Evolution des Molaires et Premolaires chez les Primates et en particulier chez l'Homme." In this he withdraws somewhat from the position he took in his L'Homme dans la Nature and concedes that the molars must be traced back, step by step, to lemurian forms; but claims that the fundamental types of the molars are identical in man and the anthropoids; that these latter belong to the monkeys; while man as he is at present constitutes a sub-order in the general order of Primates.