correspond to the electrotonic currents of nerves. In addition, he noted that amalgamated zinc wires surrounded by a solution of zinc sulphate do not give such currents, from which he decided that electrotonic currents are the result of polarization. This view was corrobo-

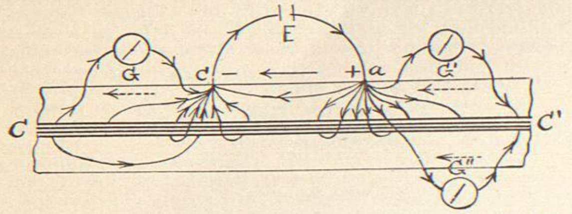

FIG. 1853.—Electrotonic Currents of a Core-Conductor Model. *C–C'*, Good conducting metal core, surrounded by fluid sheath; *E*, battery; *G*, *G'*, *G"*, galvanometers; *A*, anode; *C*, cathode of battery current; black arrow, direction of battery current; dotted arrow, direction of electrotonic current as shown by galvanometers. (Copied from Hermann's "Handbuch," Bd. ii., Abthl. i., S., 176.)

rated by Schiff ("Nuovo Cimento," ave., 1868). The phenomena to be observed on core-conductor models and their relation to electrotonus in nerves were thoroughly investigated by Hermann (Pflüger's *Archiv*, v., S. 264, 1871; vi., S. 312, 1872; vii., S. 301, 1873; "Handbuch," Bd. ii., Abthl. 1, S. 174–184, 1879).

The core-conductor models employed by Hermann consisted of a platinum wire surrounded by zinc sulphate, and of an amalgamated zinc wire surrounded by zinc sulphate. The wire was passed horizontally through the middle of a glass tube containing the fluid. A number of short tubes, welded to the upper side of the main tube at stated intervals, permitted the entrance of the polarizing and leading-off electrodes, which were made of amalgamated zinc.

With this arrangement he was able to demonstrate many of the more important phenomena associated with the production of electrotonic currents in nerves. He offered the following explanation. In the case of the core conductor in which there is no polarization, such as an amalgamated zinc wire surrounded by zinc sulphate, the battery current takes the shortest path through the fluid sheath from the electrodes to the good conducting core; if, however, polarization occurs at the boundary between the sheath and the core, as happens when platinum wire is used, counter currents are set up, which resist the passage of the battery current from the sheath to the core beneath the anode, and from the core to the sheath beneath the cathode, and cause the polarizing current to spread widely along the sheath into the extrapolar regions. The current thus spreading through the moist sheath can be detected by a galvanometer connected by electrodes with the sheath in the extrapolar regions, and the current wherever tested is found to have the same direction as the polarizing current.

H. Weber (Borchardt's *Journ. f. Math.*, lxxvi., S. 1; Pflüger's *Archiv*, vii., S. 319), working with Hermann, from a mathematical research, decided that in theory metal cores are not essential to core-conductor phenomena, and that two electrolytes with polarizable contact surfaces would give like results. Hering ("Lotos. Prag.," Bd. ix., 1888) worked with models without a metal core, and therefore still more resembling nerves. He used a hollow stem of grass, soaked in water, and then filled with a strong sodium chloride solution which conducts well as compared with water. In these, too, polarization occurs at the surface of contact between the good conducting core and the less perfectly conducting sheath. Hermann says that a difference in the conduction power of core and sheath may not be essential.

Within a few years a number of papers have appeared which show an astonishing similarity in the electrical phenomena to be observed on nerves and core-conductor models. Indeed, it is claimed by some observers (Boruttau, Pflüger's *Archiv*, lviii., S. 1, 1894; lix., S. 47, 1895; lxiii., S. 158, 1896; lxviii., S. 351, 1897; Hoorweg, Pflüger's *Archiv*, lxxi., S. 128, 1898) that all the electrical phenomena which can be observed on nerves are exactly reproduced by these models. Boruttau says the form of model that most exactly imitates the electrical phenomena observed on nerves is that of Radzikowski ("Institut Solvay, Travaux de laboratoire." t. 3, fasc. 1, pp. 1–22, Brussels, 1899), which consists of a magnesium wire in dilute sodium chloride.

Electrolytic Polarization Effects.—Waller in his lectures on "Animal Electricity" argues strongly in favor of the view that extrapolar electrotonic currents are the result of electrolytic polarization, and he gives an excellent picture of the way such electrolytic changes may occur, and how they may produce the polarization currents that cause the spread of battery currents along the nerve. Gotch also (Schaefer's "Textbook of Physiol.," vol. ii., pp. 540–547, 1900) illustrates these effects well. If a battery current be sent through a fluid conductor, the current causes an electrolytic decomposition of the electrolyte and the collection of the ions at the poles. Acids, oxygen, chlorine, etc., electro-negative ions, collect at the anode, gases, hydrogen, sodium, etc., electro-positive ions, collect at the cathode.

If the current be strong, O and H may be seen to come off as bubbles. If it be weak there is still a separation of ions, though they may not be visible. The fact that such an electrolytic decomposition occurs and that the ions collect at the two poles may be detected by introducing into the solution some substance which will change color under the influence of an acid or an alkali. Waller has employed a solution of dextrin and potassium iodide to illustrate the phenomena. The battery current decomposes the iodide of potassium, the base collects at the cathode and the iodide at the anode, where it strikes a red color with the dextrin.

Gotch suggests the use of methylene blue, which is blanched on being reduced at the cathode and takes on a stronger color under the influence of the acid at the anode.

The products of the electrolytic change are themselves capable of generating a current, the anodic ions being galvanometrically positive to the cathodic ions. That they do this can be ascertained by letting a battery current flow through a moist conductor, and then disconnecting the electrodes from the battery and connecting them with a galvanometer, when a current of op-

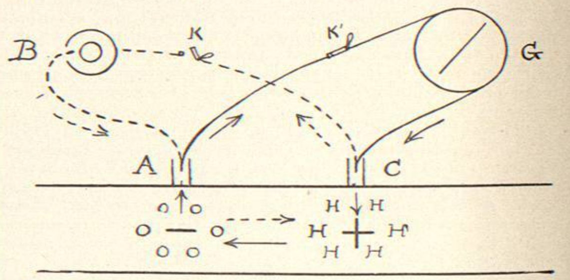

FIG. 1854.—Diagram of Polarization Currents in a Moist Conductor, when a Battery current is led through by Metal Electrodes. *A* and *C*, metal electrodes; *B*, battery; *k*, *k'*, keys; *G*, galvanometer; *O*, acid, negative, but galvanometrically positive ions; *H*, basic, positive, but galvanometrically negative ions. The dotted arrows show the direction of the polarizing current, and the black arrows the direction of polarization currents observed with galvanometer after opening of battery circuit.

posite direction to the preceding battery current will be indicated. This is the so-called polarization current.

This polarization change is most marked at the point where the metal electrodes come in contact with the moist conductor.

This external polarization effect may be greatly lessened by employing "non-polarizable" electrodes. In case the moist conductor is composed of more than one substance, and these have different capacities of conduction, an internal polarization may be observed. Such is especially the case with medullated nerves.

Waller ("Lectures," p. 90) shows that the human body may be internally polarized by the flow of a battery current. He took two pairs of cups containing salt solution, and connected one pair with a battery and the other with a galvanometer. He then dipped two of his fingers into the first pair of cups, thus completing the battery circuit through himself; he then removed those fingers, and dipped two others into the cups connected with the galvanometer; this showed a deflection, proving that there had been an internal polarization of his body.

DuBois-Reymond showed that the electrolytic polarization occurs at the interspace, *i.e.*, the point of contact, of the different moist conductors. This is illustrated in the following scheme (Fig. 1855).

In this case, the electrolytic effects are supposed to occur at the contact of the surfaces of the sheath and core.

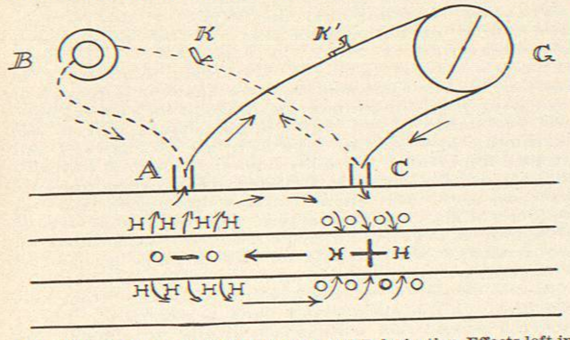

FIG. 1855.—Diagram showing the Internal Polarization Effects left in a Core Conductor, such as a Nerve, after the withdrawal of the Polarizing Current. *B*, battery; *A* and *C*, non-polarizable electrodes; *k*, *k'*, keys; *G*, galvanometer; dotted arrows, show course of polarizing current; black arrows show course of polarization currents in axis and sheath, as indicated by the galvanometer after opening of battery circuit.

We have to consider that internal anodes exist where the battery current enters the axis cylinder beneath the anode, *A*, and where it enters the sheath beneath the cathode, *C*, and internal cathodes where the current leaves the sheath below the anode, and where it leaves the axis cylinder beneath the cathode.

Negative, acid ions would collect at the internal anodes, and positive, basic ions at the internal cathodes, and these would cause the polarization currents in the axis and sheath indicated in the diagram. When the battery circuit is broken and the galvanometer circuit closed, a part of these currents will flow through the galvanometer, and the region of the anode will be found to be galvanometrically positive with reference to the region of the cathode.

Cause of Extrapolar Electrotonic Currents.—(*a*) *After the Polarizing Current is Withdrawn.* The electrolytic polarization effects are the most marked directly beneath the anode and cathode. When the battery current ceases to flow, the sheath of nerve beneath the anode will be galvanometrically positive to all other parts of the sheath, and therefore polarization currents will flow from this part of the sheath to the other less positive, extrapolar as well as intrapolar parts of the sheath, and return currents will come back to the anode through the core. If two points of the extrapolar region be connected with the galvanometer, a part of these extrapolar currents will flow through the galvanometer circuit from the point nearest the anode to the one more distant, these threads of current returning to the anode through the core. In a like manner, since the part of the sheath near the cathode is more negative than other parts of the sheath, if two points of the cathodic extrapolar region be connected with a galvanometer, current threads will be obtained flowing from more distant parts toward the cathode, and indicating a flow of current in the core away from the cathode. As a matter of fact the thickness of the sheath of a core conductor has an important influence, but this question need not be discussed here (Gotch, Schaefer's "Textbook of Physiology," vol. ii., p. 544, 1900).

(*b*) *During the Flow of the Polarizing Current.* The conditions which lead to the production of the extrapolar currents which are detected in a core conductor and nerve after the polarizing current has been withdrawn are present during the flow of the polarizing current. Electrolytic polarization effects begin to develop at the instant the polarizing current enters, and continue throughout its flow. They are, therefore, one of the sources of the electrotonic currents observed in core conductors and nerves during the flow of the current (Gotch, Schaefer's "Textbook," p. 546). Another cause is to be found in the fact that the polarization currents which develop about the core resist the passage of the battery current from the sheath to the core and from the core to the sheath, and cause it to spread widely into the extrapolar regions.

Relation of Polarization to Excitation and Conduction.—Pflüger says that the beginning of our knowledge of electrotonus starts with the observation of Ritter ("Beiträge zur nähern Kentniss des Galvanismus," etc., Jena, 1802) that the irritability of a nerve is altered by the flow of a current, and differently for ascending and descending currents. The fact that the flow of an electric current through a nerve may lead to the development of electrotonus was first observed by DuBois-Reymond ("Untersuch. ü. thierische Electricität," Bd. ii., Abth. 1, S. 289, 1849). He considered excitation to be closely related to the electrotonic changes which he observed, and these to be associated with the electrolysis produced by the current. Although he recognized electrotonus and excitation to be intimately related, he did not regard the electrotonic state to be identical with the process of excitation as manifested by sensation and movement. His statement, "Galvanic excitation is only the first stage in the electrolysis of a nerve," has received support from many of the latest observations.

Pflüger recognized that there is a very close relation between the polar changes of irritability and conductivity which he observed and the polar electrical phenomena of electrotonus, but regarded them as the different symptoms of the internal molecular changes produced by the battery current in the nerve. DuBois-Reymond ("Untersuch.," Bd. i., S. 258) had formulated a general law for excitation, viz.: excitation is caused not by the continuous flow of a current, but by changes of intensity within short intervals of time, and Pflüger ("Untersuch. ü. d. Physiol. d. Electrotonus," S. 445, Berlin, 1859) interpreted this law to mean that excitation depends upon the rate at which the inner molecular constitution of the nerve is altered by the application of some external force, and found this law to be in harmony with his law of "polar excitation of nerve,"—"a given stretch of nerve is excited by the development of catelectrotonus and the disappearance of anelectrotonus, not, however, by the disappearance of catelectrotonus and the development of anelectrotonus" ("Untersuch.," S. 546). He associated excitation with the sudden rise of irritability which occurs at the cathode on the closing, and at the anode upon the opening of the current.

Hermann followed up the observations which Matteucci had made in 1863 on core-conductor models, and concluded that electrotonic currents and the electrical phenomena to be observed on nerves when they are excited, can be explained by the chemico-physical effects of the current; and further, that the explanation of the "law of polar excitation" developed by Pflüger is to be sought in the electrolytic changes which the current produces at the two poles. Hermann (Hermann u. Weiss, Pflüger's *Archiv*, lxxi., S. 279, 1898) states that as early as 1867 ("Untersuch. ü. Muskeln u. Nerven," Heft 2, S. 41–42, Berlin, 1867) he developed a theory that under the influence of the cathode the splitting up of chemical compounds in the tissue is hastened (dissimilation occurs), and so negativity is produced in the neighborhood of the cathode, and under the influence of the anode decomposition is delayed and perhaps synthetic changes produced, whence a condition of positivity is developed near the anode. He says that later he gave this theory up for a better one, but it has been accepted by many and was brought forward again by Hering and Biedermann ("Ber. d. Oesterr. Akad. Math. Naturwiss. Cl.," Abthl. 3, Bd. 997, S. 145, 1888; Biedermann, "Electrophysiologie," S. 706, Jena, 1895), who described electrotonus of the nerve as a physiological phenomenon and different from the physical change to be observed on core-conductor models. Through this some confusion in terminology arose. Bernstein classes under physiological electrotonus the changes in irritability, and under physical the galvanic phenomena produced by the current. Hermann is not satisfied that such a division is admissible, nor is it now generally accepted. Hermann (*loc. cit.*, S. 280) says: "For me all physiological phenomena of electrotonus are only effects of polarization of the nerve core, these being at once the result of the action of the current and the cause of its spread into the extrapolar regions." The assumed assimilation and dissimilation effects find place under the physiological action of positive and negative polarization. Boruttau (Pflüger's *Archiv*, lviii., S. 51, 1894; lix., S. 47, 1895; lxiii., S. 154, 1896; lxvi., 1897; lxviii., 1897; lxxxi., S. 360, 1901), in his many papers on this subject, favors the view that excitation always goes hand-in-hand with a catelectrotonic condition and that the current of action can be identified with "a wave-like spread of catelectrotonus." He arrived at the view through his experiments on core-conductor models, on which he claims that all the electrical phenomena to be observed on nerves can be reproduced. His experiments have shown an astonishing similarity beween the way in which electrical waves traverse these models and the way that the waves which accompany the nerve impulse pass along the nerve. Even very brief currents, such as induction currents, can cause catelectrotonus; and he finds that if a series of equal induction currents of alternating direction are passed through a portion of a core-conductor model, the opposite equal polarization effects cause a condition of negativity, of catelectrotonus, to develop near the electrodes on each side of the polarized region. Hoorweg (Pflüger's *Archiv*, lxxi., S. 128, 1898) as the result of his experiments comes to much the same conclusion as Boruttau, but Hermann (Pflüger's *Archiv*, lxxi., S. 294, 1898) states that he is not prepared to go as far as Boruttau, and does not consider that core-conductor models can be looked upon as nerve models in respect to irritability; they are, for him, models of electrotonic effects of the current. He considers that polarization, and the excitation associated with its development and disappearance, are to be held as distinctly separate phenomena. This year he writes (Pflüger's *Archiv*, lxxxiii., S. 360, 1901) with reference to the current of action and excitation: "One need not consider these as separate properties; on the contrary, for me excitation is nothing more than that change in the core which causes the potential of the current of action."

Pflüger found that the sudden cessation of anelectrotonus as well as the establishment of catelectrotonus is associated with a sudden rise of irritability and excitation. This is difficult to explain on the theory that excitation only occurs on the establishment of catelectrotonus. Gruetzner (*Breslauer aerztl. Zeitschr.*, No. 233, 1882) and Tigerstedt ("Mitthl. a. d. physiol. lab. d. Carolin. Instit. in Stockholm," Hft. 2, Abthl. 2, 1882) have tried to meet the difficulty by attracting attention to the fact that on the opening of the polarizing circuit a catelectrotonic condition is developed at the former anode, through the establishment of the polarization after-current of opposite direction. This explanation is not altogether satisfactory to Gotch (Schaefer's "Textbook of Physiology," ii., p. 499, 509, 1900) who points out a number of difficulties, and decides that something more than the effect of the after-polarization current must be at work in the production of the opening excitation; it appears to have been accepted by Hermann, Boruttau, and others who associate excitation with the catelectrotonic state.

The prolonged, more or less continuous excitatory condition seen to follow the opening of a strong current that has flowed through a nerve for a considerable time, and which is known as "Ritter's opening tetanus," like the continuous contraction which may develop during the flow of a strong current, is generally attributed to an irritation caused by the ions liberated at the two poles during the flow of the current.

Relation of Polarization to Conduction.—The excitation process is transmitted in nerves in the form of a wave, at a definite rate, without loss of energy; electrotonus is developed instantaneously, is a stationary condition, and lessens in intensity with increasing distance. As Waller ("Lectures on Animal Electricity," p. 114, London, 1897) states, both electrotonic currents and currents of action are expressions of polarization, but the former is a stable, the latter a fleeting change, propagated as a wave along the compound electrolyte. If this be true, how can the excitation associated with the development of catelectrotonus result in conduction? Hermann (Pflüger's *Archiv*, lxxv., S. 574, 1899) recalls that as early as 1872 he expressed the view that the polarization which occurs at the bounding surfaces of the axis cylinder and the sheath of the nerve might play a part in the conduction process. He says there are two laws of the utmost importance in this connection, that of Pflüger, that a part of a nerve is irritated when catelectrotonus increases and when anelectrotonus diminishes, and his own law of the current of action, that every cross section of a fibre is negative in respect to one less irritated or not irritated. Since an irritated part of a core is negative with reference to neighboring parts which are at rest, currents would be set up which would flow from the core through the sheath and back to the core. These currents would act catelectrotonically to excite the neighboring inactive parts, and anelectrotonically to inhibit the part which had been irritated. On this basis, as the wave of excitation passes, each point becomes first catelectrotonic and then anelectrotonic. The idea that an anelectrotonic condition immediately follows a catelectrotonic explains for Hermann why it is that not all the available energy-producing substance made irritable by the condition of catelectrotonus is used up by a single excitation. Werigo (Pflüger's *Archiv*, lxxxiv., S. 618, 1901) thinks that it is unnecessary that anelectrotonus should thus follow catelectrotonus, because, if currents are of short duration, the rapid rise of excitability at the cathode is always followed by an immediate fall of excitability. Hermann (Pflüger's *Archiv*, lxxiv., S. 582, 1899), at the close of a paper in which he attempts to give a mathematical expression to his theory of nerve excitation, writes, "The irritation works on the current formation just like self-induction," but he says that we cannot assume self-induction for protoplasm.

Hermann's theory of the conduction process requires excitability in the conducting part, and the claim has been made by a number of investigators (Gruenhagen, Efron, Gad and Sawyer, Goldscheider, Piotrowsky) that they have observed conductivity in parts of a nerve which had lost their excitability, through the application of cold or some narcotizing drug. The excitation wave is evidently closely associated with a wave of electrical negativity, but the question arises, Are these to be regarded as inseparable in the case of nerves? The current of action can be demonstrated on a core-conductor model where there can be no question of excitation; and, as Hermann observes, a platinum wire is not a model of an irritable nerve, but only one to illustrate its electrical properties. Gotch and Burch (*Journ. of Physiol.*, xxiv., p. 144) found in experiments in which two rapidly following excitations were given to a nerve, different parts of which were at different temperatures, that excitation can pass along a stretch of nerve without a current of action developing. Herzen (*Centralbl. f. Physiol.*, xiii., S. 455; *Revue Scientifique*, January 13th, 1900) found that a nerve poisoned with chloral, and presumably not irritable (since no muscular contractions resulted from excitation), was still able to conduct and give a negative variation. Radzikowski ("Ins. Solway, Travaux de lab.," iii., fasc. 1, p. 1, 1899) found currents of action in nerves which were apparently not functioning, since they did not excite the muscles. According to him, the current of action is simply a chemico-physical change resulting from the core-conductor structure, and not essentially connected with function. These results are by no means generally accepted. Thus Wedensky (Pflüger's *Archiv*, lxxxii., S. 124, 1900) considers that excitability and conductivity are inseparably connected, and Boruttau (Pflüger's *Archiv*, lxxxi., S. 360, 1900; lxxxiv., S. 325, 1901), after reviewing the work that has been done by others on this subject and describing a large number of experiments of his own, concludes with a reiteration of the view, already frequently expressed by him, that the appearance of currents of action without true functional activity of the nerve or the reverse never occurs.

There can be no doubt that electrolysis and the consequent polarization phenomena can exist independently of excitation, for they are to be observed on core-conductor models in which there is no question of excitation in the physiological sense. All the electrical phenomena to be detected on nerves can be reproduced on core-conductor models, and, therefore, we are justified in assuming that in the nerve as in the model they may be chemico-physical processes. This conclusion does not prevent us from considering the electrical phenomena detected in nerves as physiological processes, for they are to be found in nerves only so long as the chemical and anatomical structure peculiar to living protoplasm is maintained, and are modified by any influence which alters the functional activity of the tissue. Probably strengths of current capable of producing excitation will always produce, if suitably applied, polarization, but it by no means is sure that polarization effects may not occur independently of excitation.

Although we cannot say that polarization and excitation are identical, it is evident that they are very closely related and can be considered as two different symptoms of the same chemico-physical changes of the living protoplasm. The closeness of the relation is made evident by the fact that they are influenced in the same way by so many different conditions. Both excitation effects and polarization are most marked in medullated nerves; both require the integrity of the nerve fibre, and both are altered in a similar manner by most of the influences which affect the activity of nerve protoplasm; both are increased when the length of nerve subjected to the current is increased; both are increased by an increase in the intensity and duration of the current; currents of very short duration, such as induction currents, can produce polarization as well as excitation; finally, the more rapidly polarization develops the greater the excitation.

Warren P. Lombard.

ELEMI.—Of the several resins which at one time or another have been sold under this name, that in use at present is the one known as Manilla elemi, and comes from the Philippines.

Elemi exudes from incisions in the bark of one or more species of *Canarium* (fam. *Burseraceæ*). *C. commune* L., of India, yields one variety, but it is apparently not that now in use, which comes chiefly from the island of Luzon.

Elemi is a soft, translucent, grayish-white or yellowish substance, of pleasant aromatic odor, and rather terebinthinous taste. It comes in large cakes or masses, often very much contaminated with dirt, chips, and leaves. The British official description is as follows: "When fresh, soft, granular, resinous, and colorless, but by keeping it becomes harder, and of a pale yellow tint. Odor, strong and fragrant, somewhat resembling fennel and lemon. Moistened with rectified spirit, it breaks up into small particles, which, when examined by the microscope, are seen partly to consist of acicular crystals."

COMPOSITION.—According to Flückiger it contains ten per cent. of *essential oil*, which may be separated upon fractional distillation into six portions, all of the turpentine series, $C_{10}H_{16}$, or C_5H_8. The remaining resin is a complex mixture, from which several crystalline, resinous substances—*amyrin*, *bryoidin*, *breidin*, etc.—and amorphous resins have been separated. *Elemic acid* is finally another ingredient.

ACTION AND USE.—Elemi is a local stimulant, like turpentine and resin, and is put to the same uses. Its only employment here, and that quite rarely, is as an ingredient of plasters and ointments. *Unguentum Elemi* was made of elemi one part and simple ointment four parts.

W. P. Bolles.

ELEPHANTIASIS.—(Synonym: Elephantiasis Arabum; Barbadoes leg; Morbus herculeus; Spargosis of the Egyptians; Pachydermia; Sarcoma mucosum; Tropical big leg; Bucnemia tropica; Hypersarcosis; Phlegmasia malabarica; Mal de Cayenne.)

DEFINITION.—A non-contagious endemic or sporadic disease, characterized by a chronic hyperplasia of the true skin and subcutaneous tissues; usually limited to an exclusive locality, and preceded by a local disturbance of the circulation, especially in the lymphatic vessels; and terminating in swelling, œdema, induration, progressive hypertrophy, more or less pigmentation, the development of fissures, and the growth of the papillæ.

Owing to its great antiquity and the prominence awarded it by the earliest medical authorities, elephantiasis must be regarded as a disease of phenomenal interest. Its name would seem to imply that it originated in Arabia; indeed, according to the most ancient history of medicine, it first prevailed in that country and was of common occurrence. Formerly the term was practically unlimited in its application and failed to express with even approximate accuracy the various forms and phases of the disease. It apparently embraced all the morbid conditions of the human body which involved the enlargement of a specified part, and pointed particularly to the condition described as lepra græcorum. Truly, this was a most unfortunate name, as it was many times applied to lesions of a totally different pathological character. Happily, however, the employment of this generic term for diverse morbid processes has finally been discountenanced, being at present confined to a single disease.

While elephantiasis is a typical pandemic disorder, characterized by wide differences, it is either endemic or sporadic in its distribution, differing symptomatically as to its exciting causes, but with like results in all cases.

The endemic form is essentially a disease of the tropical and subtropical regions, appearing most frequently in Africa, India, the Indian Archipelago, the West Indies and South America. The sporadic form occurs all over the world; the endemic type is rarely encountered beyond the 35th degree of North and South latitudes. In Travencore it is very common, affecting about five per cent. of the entire population, while in some of the South Pacific Islands nearly one-half of all the inhabitants are its victims.

In the United States the disease is comparatively rare, being more prevalent in our territorial possessions and in the South than in the North, where, indeed, it does not seem to spring from the same cause. The pathological process is so different in the two groups of the disease, as to etiology, symptomatology, and course, that there seem to be two distinct types of the disease, covering a multitude of hypertrophic conditions, such as result from congenital elephantiasis, telangiectodes and lymphangiectodes, or acquired obstruction of the lymphatic system, and including cases of chronic phlegmasia dolens and hypertrophy originating in chronic eczema and varicose veins.

The endemic form declares itself somewhat suddenly, and is accompanied by pain and inflammation of the parts affected, more or less well-marked febrile symptoms, and the so-called elephantoid fever which is usually

REFERENCE HANDBOOK OF THE MEDICAL SCIENCES.
Electrotonus.
Elephantiasis.