sleep is associated with a retraction of the small protoplasmic prolongations and consequent interruption of contacts, are erroneous. He believes that the inter-neuronic suspension of contact is of quite secondary importance, and that the characteristic condition in natural sleep, as in that induced by chloroform, ether, or chloral, is a general expansion of the gemmule, with exhaustion of their contractility at the beginning and renewed capacity to contract at the end of sleep. It is not necessary that the suspension of psychical activity and of functional relations between neuron and neuron should depend exclusively upon the suspension of anatomical connections. It is possible that fatigue and the concomitant auto-intoxication are combined physiologically with a state of greater torpor of those movements that are characteristic of activity. If these premisses are admitted, then it is easy to comprehend the mechanism of sleep in its various phases. If the brain is fatigued, if in it there abound those regressive products which are an obstacle to function, that retraction of gemmule which isolates the systems of neurons that are in a state of functional activity and which secures the momentary autonomy of the functional association and of the corresponding psychical process will be carried on in a much more torpid manner and less completely. It follows that the logical association of ideas and the activity of the attention are rendered more difficult. Association will become more and more delayed and incoherent. What is done by the auto-toxic action of regressive products can be done also by the inactivity of the neurons through want of stimuli. If the representative psychical activity is weak and there is a scanty inflow of external stimuli, the central elements assume their attitude of repose—that is, of greatest expansion; the contacts are multiplied, the *processi nervosi* become more and more dispersed and incoherent, the associations are enormously diffused, the stimuli subside without provoking reaction, and there results the unconsciousness of sleep.

It is the new conception of cerebral activity as involving a cutting off of the great majority of interneuronic connections and the strengthening of the current traversing the few that are essential for the autonomy of the functional association for which we are chiefly indebted to Lugaro. As we realise something of what such a mechanism implies, the mystery of how the brain works begins at last to be in some degree intelligible.

No doubt many objections might be raised against Lugaro's theory; but, based as it is upon strong experimental evidence, it deserves at least the most careful consideration of all who are interested in such questions. If it is true, it throws a flood of light upon many problems which have hitherto been almost entirely obscure, and most of all perhaps upon some parts of the dark domain of mental disease.

INVESTIGATIONS ON MALARIA IN ITALY.

REPORT BY PROFESSOR CELLI.

THE first annual report was presented by Professor Celli to the Italian Society for the Study of Malaria at its first meeting on December 3rd, 1898. Professor Celli, who occupies the Chair of Hygiene in the University of Rome, stated that the report embodied the results of the investigations on malaria made by members of the Society during the past season of fevers—that is, from the beginning of July, when the Society was formed, till the date of the meeting. It was known that in recent years the life of the parasites of malaria in the blood of man and of animals had been well recognised. Notwithstanding this, two problems of enormous interest for humanity had remained enveloped in darkness—namely, how the malarial germs live in the environment, and how from the environment they return to infect man and the lower animals. When these problems are solved, said Professor Celli, one may hope to find the mode either of killing the maleficent germs where they lodge by means of direct drainage, or of protecting man and the useful animals from them. He proceeded:

But may not this latter scope of preservation, the supreme end of all the studies, also be reached by another way—that is, by means of substances which give artificially that immunity which Nature sometimes concedes both to man and the lower animals? In reference to the first problem it must, above all, be remembered that the Mexican authors Smith and

Kilborne have demonstrated, and Koch has confirmed, that certain ticks are undoubtedly the vehicle of bovine malaria.

As to the vehicles of human malaria, in the Institute of Hygiene at Rome the numerous and repeated attempts to reproduce malaria in birds by means of the inoculation both of malarial earths and of cultures of amœbæ which there are found were always fruitless; and water as a vehicle of malaria was also excluded, which has been abundantly confirmed elsewhere. On the other hand, some authors had already thought that mosquitos were in some way connected with the biology of the malarial parasites. Thus, Laveran and Manson had maintained that man is infected by drinking water contaminated by mosquitos, in which, after the puncture and the sucking of malarial blood, the infective parasites are developed as an intermediate host.

Bignami, on the other hand, by the process of exclusion and with indirect proofs, came to the conclusion that malaria bears itself in respect to man as if it were inoculated by mosquitos, and Bignami and Dionisi have also, since 1894, endeavoured directly to prove this; but through want of means they have been unable to continue their researches; and in the past year Dionisi has only been able to initiate some experiments which were favourable to the hypothesis of inoculation.

Meanwhile, under the wise guidance of Manson, Ross of Calcutta succeeded in determining the cycle of life of the malarial parasites of birds in the body of a particular species of mosquitos.

The direct proof of the possibility of transmission of human malaria by these insects was then more than ever urgent; and fortunately it was also possible, thanks to the means that the Society from its initiation had been able to put together.

Our members were able to institute experiments in two ways: that is, to investigate how malarial acted in relation to a certain number of men living in a highly malarious place, and protected in an absolute way from the bites of insects; and to investigate if individuals never subject to malarial fevers, living in a healthy place and bitten by mosquitos captured in malarial places, would catch the fever.

The first mode was attempted by Fermi in the Pontine marshes, but many difficulties were met with in carrying out experiments in a rigorous way. The second was therefore adopted. In a room of the Ospedale di S. Spirito individuals were made to sleep who had resided for some years in the hospital, and who never had had malarial fevers. In this room adult mosquitos brought from malarious places or developed from larvæ collected in the Campagna were set free.

Thus four experiments were made from the end of July onwards. The first on two individuals, with adult mosquitos captured in Porto, was interrupted after a few days for want of sufficient material.

The second, in one man only, with mosquitos developed from a collection of larvæ, was continued from August 8th to the 28th, and was interrupted when the patient had a slight rise of temperature with a sensation of cold and *malaise*, which ceased without further consequences. The third, on a man named Sola, was conducted in the same way from August 24th to September 19th, being interrupted when Sola began to suffer from *malaise* and headache, with a slight rise of temperature. In Sola also all this remained without result. Analogous experiments and with like negative results were made by Fermi at Terracina and by Grassi at Rovellasea. Meanwhile, starting from the consideration that whether the mosquitos truly inoculate the malarial parasites, in the localities where malaria develops there are several species to be found, Grassi undertook a series of comparative researches in the most desolate parts of Italy, during the past æstivo-autumnal malarial season. He came to the conclusion that in the malarious places several species of mosquitos, large and small, exist which do not find the suitable conditions for reproduction in non-malarious places. Taking into consideration the abundance of the above-mentioned species in the season of fevers, Grassi came to the conclusion that these species must be held to be extremely suspicious. They are: the *anopheles claviger*, the *culex penicillaris*, and the *culex malarie*. To the bites of these three species, captured in Maccarese, the man Sola, in vain bitten by other mosquitos, was subjected by Bignami in association with Grassi.

This experiment lasted from September 28th to October

21st. On November 1st Sola was seized with grave malarial fever, of which he was perfectly cured by means of quinine; in his blood were found parasites of the æstivo-autumnal species. The attendant in the laboratory of comparative anatomy who went to capture the three above-mentioned species of mosquitos, and which he captured as they bit him, was meanwhile also infected with æstivo-autumnal fever.

Grassi has also classified the mosquitos used in the negative inoculation experiments, and he has found the *Culex pipiens* to be the most common of the mosquitos which are diffused even in non-malarious places. He states that the grey mosquito which Ross has proved to be the propagator of the malarial parasites of birds in India is none other than the *Culex pipiens*. Well, Ross himself has seen that the parasites of æstivo-autumnal fevers of man do not develop in the body of this mosquito.

These researches, conducted with all the rigour and with all the precautions possible, give the first experimental proof of the fact that malaria is produced by inoculation; they demonstrate besides that the *Culex pipiens*, the most common mosquito, is innocuous for man, and they indicate how those species which Grassi has found exclusively in malarious places are capable of transporting the infection.

Is malaria contracted solely by inoculation? Is it certain that inoculation is the only means up till now experimentally demonstrated? *A propos* Bignami has made other researches directed to the obtaining of new proofs for or against the theory of inoculation. Thus he has made some experiments which demonstrate that the malarial parasites of the blood do not resist even a brief desiccation; still more he has seen that in the peribronchial glands of individuals coming from highly malarious places no form is found which might be interpreted as of a parasitic nature such as might be presumable if the malaria germs were inhaled like dust.

In his turn Bastianelli has been occupied, together with Bignami, with the morphological study of the parasites of malaria, putting it in relation with the research on the biology of the parasites external to man; directing it, therefore, principally to these parasitic forms which, according to the opinion of many, are destined to ensure in the environment the life of the parasites, that is, the semilunæ of æstivo-autumnal fevers and the flagellate bodies.

Opinions varied in the structure of the semilunæ, and nothing was known of the structure of the flagellate bodies in man.

The results of these beautiful morphological researches may be summarised in a few words:

1. The semilunar bodies constantly contain chromatin, which is found in the central part of the semiluna in a clear space that is the nucleus of the parasite; this result was constantly arrived at with the study of the preparations in which the humidity swelled the nucleus and its chromatin, and Grassi and Feletti have arrived at the same conclusions with other methods.

2. The flagella are constituted principally of a protoplasmic part and of a central part of nuclear substance.

3. The flagella derived from the masses of chromatin of the nucleus of the semilunæ and of the large bodies not divided of tertian, which become swollen, reach the periphery, and lengthen in the form of flagella.

4. Some flagellates exist, where flagellum is constituted exclusively of protoplasm, the central part remaining undivided constituted of the chromatin of the semilunar body.

This observation may be invoked as supporting the doctrine that the flagella have importance in the propagation of the species external to man. Meanwhile it is certain that Bastianelli, Bignami, and Grassi have succeeded in observing the cultivation of the semilunæ of man in the body of the anopheles claviger. Consequently Grassi maintains that this large mosquito with four spots on its wings, already declared by him to be the true index, the true spy of malaria, is the definite host of the malarial parasite of æstivo-autumnal fever, and is, therefore, a terrible enemy of humanity.

(To be continued.)

PROFESSOR CHANTENESSE, of the Pasteur Institute, Paris, has been promoted to the grade of Officer of the Legion of Honour.

LITERARY NOTES.

ACCORDING to the *Publishers' Circular*, the number of new books relating to medicine and surgery published in 1898 was 160, while that of new editions was 36. In 1897 the new books numbered 152, and the new editions 59.

That ancient and most respectable but somewhat dingy periodical, the *Archives Générales de Médecine*, has with the advent of the new year renewed its youth, or, to speak more accurately, has assumed an outward form more worthy of its inward excellence. It now appears as a large and handsome journal, well printed on good paper, while its contents show no falling-off in point of scientific value from the high standard which has been maintained by the *Archives* since the beginning of its career.

Another medical periodical which has, in accordance with the law of journalistic evolution, undergone expansion, is the *Journal of Mental Science*, which clothed in a new cover and with a larger page, presents a greatly improved appearance.

At a meeting of the New York Academy of Medicine on December 15th, 1898, Dr. A. Jacobi announced that a very rare and valuable book had just been presented to the library of the Academy by Dr. Lothar Voss, one of its honorary Fellows. Dr. Voss returned to Germany thirty years ago, being at the time a surgeon of note. He was the second person in New York who practised tracheotomy as a part of the systematic treatment of croup. He has been collecting rare and valuable books all his life, but the one just presented by him to the Academy is considered the best "find" of them all. The book, which deals with the lymph vessels, is by Gaspar Aselli, who discovered these vessels on July 23rd, 1623. He also discovered the valves, and noted that they ran in the opposite direction to those of the veins. Aselli was born in 1581, and died in 1626. The book was printed in 1627, and is said to be the first one containing coloured anatomical plates. It was reprinted twice, the third edition being in 1640, but these two later editions were decidedly inferior to the first. The work had been believed to be almost extinct. There was one copy in the University of Leipzig, and a defective copy in the library of the University of Breslau. The book just given to the Academy is one of the two copies of the first edition now known to be in existence. The Surgeon-General's Library, Washington, D.C., contains a copy of the inferior third edition of 1640.

Mr. Rider Haggard's powerful novel *Dr. Therne*, which was recently reviewed in the *BRITISH MEDICAL JOURNAL*, has received a mark of approval of a somewhat unusual kind. At a meeting of the Jenner Society held in Gloucester on December 22nd, 1898, Mr. G. E. Lloyd-Baker in the chair, the following resolution was passed unanimously:

The members of the Executive Committee of the Jenner Society desire to express their appreciation of the recognition of the work of the Society by Mr. Rider Haggard, in the dedication to its members of his powerful story, *Dr. Therne*.

They also desire to assure Mr. Rider Haggard of their warm sympathy with his just and vigorous protest against the dangerous agitation carried on against vaccination, by which many thousands of persons have been misled, and have been induced to deprive their children of the only certain protection against a virulent and fatal disease.

The Committee congratulate Mr. Haggard upon his uncompromising exposure of this evil, and trust his book may have a large circulation, as being calculated to lead a considerable section of the public, who cannot be otherwise interested in the subject, to give serious consideration to a matter of urgent and overwhelming importance, affecting, as it does, the health and lives of multitudes of hapless children who may be exposed to the infection of small-pox without the protection afforded by vaccination.

The *Phonographic Record* for January contains the valedictory address of Sir William Gowers, the retiring President, and the introductory address of Sir William Thomson, the newly-elected President of the Society of Medical Phonographers. Dr. Thomas Eastes records an interesting case of diabetes insipidus which was successfully treated by a six-days' administration of $\frac{1}{2}$ -drachm doses of liquid extract of ergot. The same number also contains a symposium by Drs. Atchley, Porritt, Strother, Goyder, Joseph, and Spooner upon the duties of the medical examiner towards the proposer, and an article upon reporters' errors.