

date as a student and investigator, together with a list of such original papers as may have been published by him. The application should be also accompanied by a statement of the character of the investigation which the candidate desires to pursue, and the dates between which he wishes to occupy the table.

Appointments will be made by the secretary of the Smithsonian for a specific period, and, in the consideration of the claims of the candidates, the Secretary will probably avail himself of the counsel of an advisory committee of four, representing the National Academy of Sciences, the Society of American Naturalists, the American Morphological Society, and the Association of American Anatomists.

Persons who may occupy the Smithsonian table are expected to make a report at the end of their term of occupation, or every three months in case of long residence at the station. It is expected that due credit will be given to the Smithsonian Institution in any publication resulting from studies carried on at its table, and the "Smithsonian Contributions to Knowledge" will probably be available for the publication of at least a part of the papers resulting from the Naples investigations.

All correspondence should be addressed to S. P. Langley, Secretary of the Smithsonian Institution, Washington, D.C.

#### STAZIONE ZOÖLOGICA DI NAPOLI.

Entre la "Smithsonian Institution," Washington, et le Professeur Dr. Antoine Dohrn, Directeur de la Station Zoölogique de Naples, a été établi le suivant

#### CONTRAT.

1. Monsieur le Docteur A. Dohrn met à la disposition de la Smithsonian Institution une table d'étude dans les laboratoires de la Station Zoölogique à Naples, aux conditions suivantes et contre l'indemnité qualifiée dans l'article 11 de ce contrat.

2. La table doit être prête à être occupée par le savant nommé par la Smithsonian Institution, dans le terme de huit jours après que l'Administration aura été avisée de son arrivée.

3. La table doit être munie des objets énumérés ci-dessous:—

(a) Des principaux réactifs chimiques,

(b) Des instruments nécessaires à la technique anatomique et microscopique,

(c) Des accessoires pour le dessin.

Les laboratoires seront dûment pourvus d'instruments et d'appareils plus compliqués qui sont devenus d'usage, pourtant ceux-là se trouveront au nombre de deux ou trois exemplaires, et l'on est tenu de s'en servir en commun.

La Station ne pourvoit pas les tables d'instruments optiques, puisqu'il s'entend que ceux qui viennent y travailler en possèdent de leur propre choix.

4. La table possède un nombre suffisant de petits aquariums pourvus d'eau de mer courante, et devant servir aux expériences que le savant se trouvera dans la nécessité d'entreprendre.

5. Les animaux qui feront l'objet d'étude seront renouvelés aussi souvent que possible et selon que le savant en demandera. On pourra en outre avoir du matériel préparé et conservé selon les méthodes voulues, afin de pouvoir continuer les études commencées à Naples.

6. Le grand Aquarium annexé à la Station Zoölogique sera ouvert gratis à l'occupant de la table, soit pour en jouir, soit pour y faire des études sur les mœurs des animaux.

7. La Bibliothèque de la Station Zoölogique est accessible à l'occupant de la table, dans une salle contiguë aux laboratoires, et peut servir de salle de lecture et à la compilation des manuscrits.

8. Les laboratoires seront ouverts à sept heures du matin en été, et à huit heures en hiver. Dans des cas exceptionnels on pourra s'accorder avec l'Administration pour d'autres arrangements, pourtant les employés ne seront pas tenus de tenir les laboratoires prêts avant l'heure indiquée. Depuis le 20 Juin jusqu'au 20 Août les laboratoires seront fermés.

9. L'occupant de la table aura le droit de prendre part aux expéditions de pêche que feront les embarcations de la Station, ainsi que de se faire enseigner les diverses méthodes en usage.

10. Les dégats commis par l'occupant de la table sur les instruments et utensiles resteront à la charge de l'Administration de l'Institut autant qu'ils ne dépasseront pas la somme de 20 francs.

11. Le présent Contrat aura la durée de trois ans, et la Smithsonian Institution s'engage à payer à Monsieur le Docteur Antoine Dohrn, Directeur de la Station Zoölogique, annuellement et par anticipation la somme de francs 2500 en or (deux mille cinq cents francs en or) pour la table louée dans les laboratoires de la Station Zoölogique.

Signé en double exemplaire.

Washington, June 9, 1893.

Naples, 16 May, 1893.

S. P. LANGLEY,  
Secretary of the  
Smithsonian Institution.

PROFESSEUR DR. ANTON DOHRN,  
Directeur de la Station Zoölogique de Naples.

In conclusion, I wish to express my obligations to the signers of the petition for their prompt and hearty support in this matter, which is of great interest to us all.

The Smithsonian Institution has now placed a table at our disposal, and in so doing has rendered to the professional biologists of the country a service which should be appreciated by all, and which will be especially appreciated by those of us who, on account of the non-existence of an American table for many years prior to the establishment of the Davis table, have either been debarred from the Naples Station or have worked there only at the courtesy of foreign institutions or by personal favor of Professor Dohrn. Let us now show our appreciation of Professor Langley's action by seeing that the table is occupied the entire time. I would respectfully suggest that those contemplating making application for the use of the table should do so at as early a date as possible, so that ample time will be given for correspondence and for arranging a proper distribution of the table so that all worthy applicants may be given an opportunity to spend a few months at the station.

Respectfully submitted,

C. W. STILES.

#### ASSOCIATION OF COLORS WITH SOUNDS.

BY B. F. UNDERWOOD, CHICAGO, ILL.

A BLOW on the head often gives rise to luminous sensations (for luminousness is a sensation and not, as is popularly supposed, a thing *per se*) and, under the influence of the shock, the person seems to see a multitude of sparks. Describing the effect of a fall on the ice, boys say it made them "see stars." Frequently there is great variety and brilliancy of colors thus seen. Vibrations which, affecting the auditory nerve, produce the sensation of sound, in some cases have the power of causing the sensation of luminousness. Indeed, there are persons who, whenever they hear a sound, also perceive a color, one sound corresponding with red, another with blue, another with green, etc. Dr. Nussbaumer, of Vienna, relates that when a child, in playing one day with his brother, he struck a fork against a glass to hear the ringing, and while he heard the sound, he discerned colors. He says that when he stopped his ears, he could tell by the colors how loud was the sound produced by the contact of the fork with the glass. Very much the same were the experiences of the brother. The doctor relates the observations of a medical student in Zurich, to whom notes of music were translated by certain fixed colors, the high notes by clear, the low ones by dull colors.

M. Pedrona, an ophthalmologist of Nantes, states that he had a friend who was accustomed to the simultaneous perception of sounds and colors, but he avoided speaking of it, not wishing to be thought strange or to be an object of curiosity or a subject of discussion. At one time a number of persons were repeating a slang expression, which occurred in some popular story, "That is as fine as a yellow dog," applying it in a jocular manner to all kinds of things and actions. One of the company said of another person, "Have you noticed his voice? It is as fine as a yellow dog." M. Pedrona's friend replied seriously and with emphasis, "His voice is not yellow; it is pure red." The downright earnestness with which the remark was made, caused the whole company to laugh outright. "What," said they, "a red voice? What do you mean?" The gentleman had to explain the peculiar faculty which he possessed of seeing the color of voices. When he had done this each person present desired to be informed of the color of his own voice. The voices were charac-

terized as blue, red, green, etc. The joke was on a young man who happened to have a yellow voice.

M. Pedrona says that his friend had perfect sight and hearing and that he was in the best of health. With him a luminous impression seemed to be made before he experienced the sonorous impression. So keen was the chromatic sensitiveness that he knew whether the sound was blue, red, yellow, or of other color, before he could judge of its quality and intensity. He differed in one respect from the Zurich student—he did not perceive a change of color with every modification of tone. A sharp note was only brighter, while the flat one was duller than the natural. The same piece of music played upon different instruments produced different sensations. A melody played on a clarinet was red and on a piano blue. The color was intense in proportion to the energy of the sound. The colored appearances of the sound were perceived on the vibrating body, for instance, on the strings of the guitar or over the keys of the piano. "The seat of color," said the person who experienced these impressions, "appears to me to be principally where the sound is made, above the person who is singing. The impression is the same if I do not see any one. There is no sensation in the eye, for I think of the same color with my eyes shut. It is the same when the sound comes from the street through the walls and partitions. When I hear a choir of several voices, a host of colors seem to shine like little points over the choristers; I do not see them but I am impelled to look toward them and sometimes, while looking toward them, I am surprised not to see them."

This association of colors with sounds is more common than has hitherto been thought by the few persons who have called attention to the phenomena. It has been assumed that the experiences were hallucinations. It is more probable that they result from some connection between the auditory and visual nervous fibres. It is now known that there are motor nerve-centres which perform particular functions, and it will probably be found that near the acoustic centres are also chromatic centres, and that, in such cases as have been described above, they echo to each other. The fibres of the nerve of hearing may thus produce vibrations at different periods of the chromatic fibres.

According to the doctrine of evolution all the other senses have come slowly into existence as so many modifications of feeling. Indeed, hearing and sight, as well as taste, are modes of feeling. Differentiation of feeling has, in the evolutionary processes, corresponded with the differentiation of physical structure. In the lowest forms of life there are no developed and defined parts like the organs of hearing, sight, smell, and none such as in the higher animals make possible variety and sensitiveness through touch alone. "The spider's touch, how exquisitely fine," exclaims Pope. What a difference in the sensation of touch between the speck of living jelly, homogeneous so far as it appears to the eye, and a man with his differentiated structure, his several senses through which

Soft silence and the night  
Become the teachers of sweet harmony.

#### THE GULL LAKE BIOLOGICAL STATION OF THE UNIVERSITY OF MINNESOTA.

BY CONWAY MACMILLAN, UNIVERSITY OF MINNESOTA, MINNEAPOLIS, MINN.

THE establishment, during the present season, of an inland biological station, marks a new epoch in American biological instruction. While several excellent marine stations have already been organized both upon the Atlantic and Pacific coasts, and most recently upon the Gulf of Mexico, up to the present time—so far as known to the writer—there has been no inland station provided for the free use of American investigators. The great need of such a station, well equipped for every kind of biological work, has long been pressing, and it is now hoped that a foundation has been secured upon which to build as broadly as possible for the best interests of American biology. The establishment by individual enterprise of such a private laboratory as the well-known one at Milwaukee, has served to accentuate the need of an inland station, access to which might be general. The Uni-

versity of Minnesota proposes now to offer such a station, and a party of twenty, representing at least four different institutions, begin work early in June. The station is situated upon one of the deep bays of Gull Lake, in Cass County, Minnesota. This lake is about eighteen miles from Brainerd, and lies in the pine-belt of central Minnesota. It is an attractive sheet of water, about twelve miles in length and four miles in width, with irregular coast-line, and surrounded by hills, meadows, marshes, promontories, swamps and smaller lakes. With a great diversity of conditions in its vicinity and in its own waters, it is an excellent spot for general inland biological work. Its situation, too, as one of the innumerable lakes which form the general reservoir in which the great central river of the continent takes its rise, adds an interest to its study. As a region for the investigation of the various problems of isolation it is peculiarly fine. Many of the hundreds of lakes in Cass county were originally united, but are now separated from each other by permanent divides. In such waters, comparative study of the plankton, pelagic and limnetic groups of organisms can not but be productive of new and important results. Both zoologically and botanically, Gull Lake and its tributary country promise a rich field of investigation.

The laboratory buildings form a cluster of cottages on the brow of an abrupt hill, lying toward the east. The cottages number five, and in addition there is a larger building, two stories in height, with kitchen and dining room and sleeping apartments. These buildings have been placed at the disposal of the biological departments of the University through the courtesy of the Northern Mill Company of Minneapolis. Until recently, they formed a supply camp and headquarters for the company while it was cutting timber in the vicinity of the west shores of Gull Lake. The cottages are neatly plastered and papered, and form an altogether admirable series of buildings for a summer station. From Brainerd, the laboratories are reached by the Brainerd and Northern Minnesota Railway, the officials of which have assisted much in the development of the plan of establishment.

Apparatus of all necessary sorts has been shipped from the University, and the investigators in the station will be given every facility in the power of the University to pursue their work under favorable and inspiring conditions. Boats have been put upon the lakes, and a steamer belonging to the Northern Mill Company has been placed at the disposal of the station for extended trips about Gull Lake itself. Dredges, nets, seines, collecting apparatus of all sorts, both aquatic and terrestrial, have been shipped to the station, and are in constant use. Abundant opportunity for collection may be secured, and those who desire are permitted to give their principal attention to such work, while others are engaged more particularly upon lines of special research.

The direction of the laboratory is under the professors of botany and animal biology in the University of Minnesota, and thus broadly organized there is no danger that the name will be a misnomer for a special zoological or botanical station. The plan of establishment contemplates the largest and most modern development, and equipment for work in experimental embryology, oecology, plankton study, etc., will be freely provided, as it is demanded.

To the botanists and zoologists of America it is not necessary to explain or defend the establishment of such a station. Modelled, as it is, somewhat upon the lines of its old world predecessor, Plön, it hopes by its connection with one of the state universities to offer its advantages to a constantly increasing circle of investigators, at a cost much below that which might be possible for any private institution of kindred nature. While still in an inchoate condition, when the ultimate possibilities and expectations are considered, it will begin with a relatively large corps of workers, under conditions highly favorable for a successful continuance. It will, during the first season, from June 1st to September 1st, welcome any serious student who may come to its doors. While its accommodations are not unlimited, it can care for such as give due announcement of their coming, and the directors will be glad to enter into correspondence with those contemplating a visit. The address of mail should be as follows: Stony Brook Landing, care of Northern Mill Co., Brainerd, Minn.