

especially if he had previously predicted the great tide of March 1 of the same year, which rose to 3 feet 7 inches above the mark.

With respect to the actions of the planets, I did not refer to the ordinary tide-producing power, for on working that out some years ago for one of the planets I was somewhat surprised to find that the height was, I believe, a fraction of an inch. I referred rather to the action of that storm-producing power which apparently gives rise to the great atmospheric disturbances at certain times (and, indeed, more or less at all times) in the sun, and by sympathy, or even directly, in our atmosphere.

B. G. JENKINS

Diffusion Figures in Liquids

PROF. MARTINI describes his diffusion figures as being "both new and singular." In the *Phil. Mag.* for June and November, 1864, I have described and figured various examples of what I call "the submersion figures of liquids" in continuation of a series of papers commenced in 1861 on "The Cohesion Figures of Liquids," or those assumed by liquid drops when delivered to various surfaces. Some of these figures are identical with those given by Mr. Worthington in the *Proceedings of the Royal Society* for 1876, and recently in your pages.

C. TOMLINSON

Highgate, N., December 3

Bees and Flowers

IN last Thursday's impression (p. 62) is a letter from Mr. H. O. Forbes, referring to bees confining their visits to plants of one kind during each excursion, and thus in a measure preventing hybridisation of plants, &c.

This may be the general habit of bees, but it is not invariable; some bees, more especially their females, are to be found at certain plants only, as *Andrena hattorfiana*, at the scabious *Colletes succincta*, at the heath, and many others in like manner.

I have collected bees for several years, and have often taken them with the pollen-grains varying from orange-red to almost white, and this mixture on the same leg. I have inclosed a slide of pollen-grains which I washed from the leg of an *Andrena nigro-areolaris*, and mounted in balsam; this shows several very distinct kinds of pollen; this was mounted in 1875, and at the time I gathered such of the wild flowers as were then in bloom, and compared the pollen. I was able to identify several of them, but as I made no notes I cannot say which. I would advise such observers as intend investigating this very interesting subject, to capture the insects and examine the pollen which may be found on them; this will be difficult in the case of the Bombi and Apis, as they knead it into pellets, but with those which collect on the belly or whole leg it will be easy enough.

Norwich

JOHN B. BRIDGMAN

Hearing in Insects

My daughter bred this summer a number of the larvæ of *Sphinx ligustri* and *Metopisilus eleonor*, and I was much struck with the extreme sensitiveness to the sound of the voice—especially of the former. The child's treble I observed did not affect them so sharply; but at the first word I uttered they invariably started, and remained some time motionless, with head drawn back, after their manner. I was disposed to attribute it to the vibration set up in objects around by sounds toward the deeper end of the scale, as I have felt a form tremble under me at the deep bass notes of a strong singer; but it had all the appearance and effects of hearing.

HENRY CECIL

Bregner, Bournemouth, December 1

A ZOOLOGICAL STATION FOR THE CHANNEL ISLANDS

SOME definite prospect at length presents itself of the establishment within British waters of an institution long recognised as a leading desideratum among our Biologists, Museum-Conservators, and Natural History Students, namely, a building with the necessary appurtenances suitably situated, and founded on a somewhat similar basis to that of Dr. Anton Dohrn's noted Zoological Station at Naples, or the Anderson School of Natural History at Penikese Island, Buzzard's Bay, U.S. This

long-felt need will be met by the proposed "Channel Islands' Zoological Station and Museum, and Institute of Pisciculture" described at some length in the advertising columns of this journal, and the establishment of which, or a similar institution, has been the guiding star and main object of the writer's ambition during the several years' "apprenticeship" spent by him as Naturalist and Curator to the various leading public aquaria of England.

Successfully carried out, the more prominent features of this undertaking will comprise, as at Naples, in addition to an attractive public exhibition of the living inhabitants of the surrounding waters, laboratories fitted with tanks, tables, and all the necessary instruments and apparatus requisite for the satisfactory prosecution of marine biological research, supplemented by a library replete with the standard scientific works and serials mostly in demand by those occupied in such investigation. Under the same roof it is likewise intended to establish a natural history museum accessible to the public, and more essentially illustrative of the notably rich marine fauna and flora of the Channel Islands. In connection with the library and museum departments popular lectures upon natural history subjects will from time to time be given. Following the system productive of such gratifying results at the Penikese Island Station, it is further proposed for the full development of the scientific advantages of this institution to institute summer classes for the attendance of students, and to hold out sufficient inducements for the most eminent authorities on various biological subjects to deliver lectures and a course of instruction to these classes upon that branch of natural history with which their reputation is more especially associated.

An entirely novel feature to be incorporated with the Channel Islands' Zoological Station will be a department relegated to the conduct of experiments associated with the—in this country—little developed science of economic pisciculture, and in which department it is proposed to award a prominent place to the artificial rearing of lobsters. Experiments made in this direction by the writer some years since at the Manchester Aquarium have decisively shown that the artificial culture of these crustacea on an extended and systematic scale might be developed into a highly important and remunerative industry. In the experiments here referred to it was found that the little lobsters occupied from six to eight weeks in passing through those singular free swimming larval conditions, known respectively as the "Zoea" and "Megalops" stages, antecedent to their assumption of the adult and ambulatory form, and during which short interval they exuviated or cast their shells many times. These initial metamorphoses safely past, their further development to a marketable size, is a comparatively easy task. The scientific culture of the oyster and other edible species will likewise receive attention in association with this undertaking.

The appropriateness of Jersey as a site for this intended Museum of Pisciculture and Zoological Station is at once apparent, the variety and exuberance of the marine fauna of the Channel Islands being such as to assimilate it more closely to that of the Mediterranean than any other one within British waters. The occurrence on the Channel Islands' coast of the Sea Horse (*Hippocampus*), Urchin-fish (*Diodon*), Remora (*Echeneis*), Electric Ray (*Torpedo*), and Lancelet (*Amphioxus*), among the vertebrate group; and of the *Haliotis*, *Scyllarus*, *Comatula*, *Physalia*, *Velella*, *Lucernaria*, and many others among the invertebrate section, are a few from among many that might be named in demonstration of this fact. The sponge-tribe and the division of the tunicate might be likewise specially singled out as attaining upon the shores of these islands a development in both numbers and variety rarely if anywhere else excelled. Unprecedented facilities for the collection of all such marine productions are also afforded by the extraordinary

low limit to which the water recedes during the monthly spring-tides. In no case less than thirty, and not unfrequently more than forty feet represents the vertical height of the rise and fall of the tide on these occasions, the waves on their retreat exposing to view and rendering accessible an extent of rocks and life-teeming pools that constitute a veritable elysium to the marine zoologist or botanist. The situation of Jersey, again, is such as to render it not only readily accessible to English naturalists and students, accompanied with just that amount of sea-passage requisite to satisfy the marine predilections of our countrymen, but it is also most conveniently reached from France, Belgium, Holland, and other Northern European countries, and which will thus invest the institution with international utility. Paris, indeed, already supplies a considerable number of the numerous summer visitors to the island, and from these no doubt might be enticed a strong contingent of students for the laboratories.

As will be found in the advertisement already referred to, a special appeal is addressed to the scientific section of the community rather than to the general public for the funds required for the successful establishment of this institution, and it is certainly most desirable that an enterprise calculated hereafter to confer so great advantages upon this more limited class should receive a fair quota of support through its ranks. The sum total required, in fact—5,000*l.*—for the founding of this zoological station, and all accessory departments, is so comparatively small as to place it not quite beyond the pale of hope that sufficient enthusiasm to effect the purpose may be yet forthcoming from among the more wealthy devotees to the shrine of science, and in emulation of the praiseworthy example set on the other side of the Atlantic by Mr. John Anderson, the munificent founder and endower of the Penikese Island Station. At all events, it is scarcely to be anticipated that so desirable an undertaking, replete with such promise of future advantage to the scientific world, will long lack the essential "sinews of war," considering that a contribution by each member of one only of our leading metropolitan scientific societies of less than one-half of his annual subscription to that society, would more than suffice to defray the whole expenditure contemplated. Through the kind liberality of a few, moreover, and the financial confidence of others, a small but substantial nucleus has been already formed, and it is confidently hoped that the full sum needed may yet be raised in time for naturalists and the public generally to participate in the advantages the Channel Islands' Zoological Station and Museum of Pisciculture will place at their disposal, so early as the summer of the year 1878.

In conclusion it is perhaps desirable to note that in drawing up the legal foundation of this Channel Islands' institution the strictest care has been taken to permanently exclude all possible chance of the society's premises being used for any of those attractions of an entirely irrelevant and unscientific nature more usually associated with exhibitions of the living inhabitants of the ocean, and the existence of which must ever constitute an insuperable barrier to that good service to science which these last-named establishments might otherwise contribute. It is only under such restrictions as are above set forth that patronage and support are solicited. In recognition of the purely scientific status of this enterprise, the members of the Executive Committee, or Directors of the Society, have also unanimously resolved to accord their services as such members gratuitously; and it is further proposed, so as to divest the undertaking of any merely speculative aspect, that all profits arising from the business of the Society, beyond what would yield to the shareholders a return of five per cent., shall be devoted to the further development of the institution, or otherwise towards the aid and promotion of scientific research.

St. Helier's, Jersey

W. SAVILLE KENT

GERMAN UNIVERSITIES

THERE have been comparisons made recently both in this and in other journals between the Universities of Germany and those of this country, and as the university question is at present giving rise to much discussion, it may be useful to give some statistics with reference to the former. Such statistics are much more easily attainable for Germany than for England, as there are two German publications in which all the important information concerning the various universities of the empire is systematically arranged, viz., the *Deutsche Universitäts-Kalender* and the *Deutsche akademisches Jahrbuch*. To obtain similar information concerning the universities of the United Kingdom it would be necessary to obtain a copy of the calendar of each university. Our statistics are obtained from the *Jahrbuch*, which contains information not only relating to the universities, but also to the technical and high schools, learned societies, and libraries of the country. Some such publication is wanted here, and might be made to include not only our various universities and colleges, but also our principal public schools. The *Jahrbuch* includes, moreover, the Russo-German University of Dorpat, the Universities of Vienna, Graz, Innsbruck, Prague, Czernowitz, Basel, but these we shall not take into account.

Germany has in all twenty-one universities, each complete in all departments. The number of students matriculated and non-matriculated attending each, mostly in the 1876-77 semester was as follows:—

	Matriculated Students.				Non-matriculated.	Total.
	Theology.	Law.	Medicine.	Philosophy.*		
Berlin	139	1003	281	1067	2107	4597
Bonn	163	200	118	312	36	829
Breslau	107	377	165	458	15	1122
Erlangen	136	37	102	147	—	422
Freiburg	41	64	128	60	36	329
Giessen ²	—	—	—	—	10	331
Göttingen	71	324	122	474	—	991
Greifswald	32	89	235	142	9	507
Halle	190	150	103	439	16	898
Heidelberg	9	410	101	215	60	795
Jena	66	101	71	201	20	459
Kiel	47	14	73	78	11	223
Königsberg	44	186	127	264	10	631
Leipzig	328	1102	364	1182	113	3089
Marburg	49	65	104	164	4	386
Munich	75	357	440 ³	408 ⁴	—	1280
Münster	208	—	—	223	—	431
Rostock	24	35	31	54	—	144
Strassburg	49	211	178	236 ⁵	26	700
Tübingen	295	251	138	335 ⁶	6	1025
Würzburg	150	93	547	328	22	1040
	2223	5069	3428	6787	2501	20229

Thus, then, there are about 18,000 matriculated students attending the twenty-one universities of Germany, under a teaching staff of about 1,300 paid professors, besides about 450 privat-docenten. Of the students, about one-third belong to the philosophical faculty, the faculty in which the sciences are included. Unfortu-

* In "Philosophy" are included the physical and natural sciences.

² The Giessen students are divided into Hessian and non-Hessian, not according to faculties.

³ Including 100 students of pharmacy.

⁴ Including 9 students of forestry.

⁵ Including 97 mathematical and natural science students, these being a separate faculty at Strassburg. The figures are for 1875-6.

⁶ Including 53 students in political economy and 141 in natural science these subjects forming separate faculties at Tübingen.