

fore wing) acquired dark borders. At the same time traces of dark spots, like those of the allied species, appeared in certain individuals, while the under side, especially of the hind wing, underwent changes which are also described in *V. io*, gaining a pattern in brown scales which recalled that of *V. polychloros*, &c. A longer period (thirty-nine days) produced far less interesting results, the blue being increased, the yellow border diminished, and the ground colour darkened. Forty-four days in the refrigerator produced more marked effects in the same direction, the blue spots of the hind wing being so increased that they project into the yellow border. The ground colour of both upper and under sides is much darkened. This beautiful variety is called by the author var. *roederi*.

As regards other species of butterflies, Standfuss's results afford valuable confirmation of those obtained by Merrifield. Thus heat (37° C.) produced light-coloured imagines of *Grapta C-album* with less sharply-defined markings and less deeply indented wing margins; while cold produced opposite effects, the dark colours of the under sides of the wings being often "mingled with moss-green tints."

In *Vanessa polychloros*, heat (37° C.) reduced the marginal blue spots and the dark wing-border, and brightened the colour of the upper sides of the wings, cold producing the opposite results.

In *V. urticae*, more extreme effects in the same direction were witnessed, heat causing an approach towards the var. *ichnusa*, and to a certain extent towards *V. io*; while cold produced butterflies which recalled the North American *V. milberti*. It was noteworthy that pupæ kept on ice for forty-two days (emerging thirteen to fourteen days afterwards), produced less deviation from the normal than those which had been exposed for only thirty-two days, and emerged nine to ten days afterwards. In neither case is there any record of the numbers of individuals made use of.

In *V. io*, heat produced little result, while cold (thirty-five days in refrigerator) caused most interesting changes in the direction of *V. urticae* and *V. polychloros*. A longer period of cold (forty-two days) still further intensified these changes, which affected the under as well as the upper sides of the wings, the well-known uniform darkness of *V. io* giving place in the most extreme examples to a sharply-defined pattern in brown scales, far more suggestive of the above-mentioned species of *Vanessa*.

In *Vanessa atalanta*, heat greatly reduced the blue in margin of the fore wing, widened the red band, and reduced the apical white spots; thus approximating towards *V. callirrhoe*. Cold (thirty-one days) conversely increased the large white spot, reduced the red band by the encroachment of dark shades, and increased the blue. A longer period of cold (forty-two days) produced ten almost normal insects and a single extreme form. It would therefore appear that less effects were, on the whole, produced by the longer period, although the materials for a valid comparison are absent, inasmuch as the author only informs us that there was "much individual variation" in the results of the shorter period.

In *Vanessa cardui* a higher temperature (40° C. = 104° F.) was made use of for two periods of six hours, alternating with one of twelve hours at the normal temperature (about 22° C. = 72° F.). Only two pupæ out of forty-two failed to emerge, although twelve produced crippled butterflies. Four specimens were of the var. *elymi*, the remainder normal. In another experiment with 36° to 37° C. for sixty hours, a remarkably pale form was produced; while in other cases the red colour, often acquiring a brownish tinge, was increased in extent on both upper and under surface of the wings. Cold (twenty-three days), on the other hand, darkened both sides of the wings. A longer period of cold (twenty-eight

days) produced, on the whole, rather more extreme effects.

In *Argynnis aglaia*, heat (four days at 36° C.) produced very little effect, the ground colour of the upper sides of the wings being lighter, the greyish-green shades of the under sides darker and more conspicuous than usual. After twenty-eight days of cold, only three uninjured insects emerged from twenty-one pupæ; in these the ground colour was unaltered, the black spots at the base of the fore wing enlarged, while the greyish-green shades, described above, gained a brown tinge. After a longer period of cold (forty-two days), two insects emerged from twelve pupæ, and these showed far more extreme effects in the darkening of both upper and under sides of the wings.

The pupæ of *Dasychira abietis* were killed by heat 37° C., while cold (forty-two days) tended to darken the insects.

Some experiments were also made upon the effects of comparative dryness and moisture upon the pupæ. Large numbers of pupæ of *Saturnia pavonia* were kept very dry from June to the end of September, and were then exposed to moisture; a treatment which the author believes, from repeated experiments, causes about 1 per cent. of the moths to emerge in about ten to twenty days, instead of hibernating. In these moths the pattern was "not sharply outlined, but more or less washed out and confused."

Towards the end of the paper the author gives a brief and general account of the results obtained by subjecting the pupæ to heat and cold. He summarises the various classes of effects as follows:

(1) "Seasonal forms" similar to those which are known to occur in nature (*V. C-album* and *P. machaon* to some extent).

(2) Local forms and races similar to those which occur constantly in certain localities (*V. urticae*, *cardui*, and to some extent *P. machaon* and *V. antiopa*).

(3) Entirely exceptional forms or "aberrations," also occurring from time to time in nature (*V. io*, *V. cardui*, *argynnis aglaia*).

(4) Phylogenetic forms, not now occurring on the earth, "but which may either have existed in past epochs, or may perhaps be destined to arise in the future" (*V. io*, *V. antiopa*, *V. atalanta*).

This portion of the paper, although of interest, is not equal to the experimental portion, and cannot be in any way compared with Dixey's careful consideration of the results of Merrifield's experiments.

It is to be hoped that Dr. Standfuss will continue his experiments on this most interesting subject. E. B. P.

A NEW SYNOPSIS ANIMALIUM—DAS TIERREICH.

FROM rough calculations lately made by the contributors to the *Zoological Record*, it would appear that some 360,000 species of animals have been described by naturalists up to the present date. To arrange all these species on a uniform system, and to add descriptions and other necessary particulars to each of them, would appear to be almost an herculean task. Yet it has been undertaken, we are told, by the German Zoological Society, which has entered into an agreement with Messrs. Friedländer and Son for the publication of such a work. Prof. F. E. Schultze, of Berlin, has been selected as general editor of "Das Tierreich," and will be assisted by numerous sub-editors in the different departments of zoology. Each of these sub-editors again will invite the assistance of specialists in the groups assigned to his charge, so that a very large number of naturalists will assist in this gigantic undertaking. It is proposed to issue the first parts of the work in 1897, and it is expected that at least twenty-five

years will elapse before the undertaking can be brought to a conclusion.

On looking down the list of contributors whose services have been already secured for "Das Tierreich," we see, as might have been expected, that they are mostly Germans. But a certain number of English and French naturalists, and some from America and Italy, have already given their adhesion to the plan, and have undertaken to furnish certain portions.

The language employed will be, as a rule, German, but contributions in English, French, and Latin will also be received.

In order to show the general style of the proposed work, Messrs. Friedländer and Son send out along with the prospectus a synopsis of the small group of *Heliozoa*, prepared by Dr. Fritz Schaudinn, of Berlin. So far as we can judge from this portion of the work, the information which it is proposed to give will be exactly what is required for such a manual, and the whole work, if carried out upon this plan, will be of the greatest value to zoologists.

One little criticism we may venture to make on the proposal. The title, we think, is not a very well-chosen one. Bronn's well-known and important work ("Die Klassen und Ordnungen des Thierreichs") has already monopolised the selected name, although in Bronn's days the new mode of writing it had not been introduced. A good Latin title, such as "Synopsis" or "Index Animalium" would have been better, and would have given to the work a more cosmopolitan character. Indeed, we believe that it would have been much better to have used Latin throughout the work, as the common language of science. There are many working naturalists in France, Italy, America, and England who do not understand German. But every one who has been to school acquired sufficient knowledge of Latin to understand a Latin diagnosis. And the proposed work will consist mainly of diagnoses.

NOTES.

THE first of the two annual conversaciones of the Royal Society will take place on Wednesday, May 6. This is the conversazione to which gentlemen only are invited.

MR. W. C. McDONALD has just given the McGill University, Montreal, further reason to be grateful for his unbounded generosity. We understand that he has offered to build and equip a building for chemistry and mining on the same scale as the engineering and physics buildings, which the University owe to his munificence, involving a cost of about £52,000. In addition to this, he has decided to found a chair of Mining Engineering and a chair of Architecture, and has added the sum of £31,000 to the endowment of the University. The completeness and liberality with which the physics and engineering departments of the McDonald buildings are equipped may be judged from an article which appeared in these columns in 1894 (vol. 1. p. 558). We cherish the hope that Mr. McDonald's generous benefactions will create a spirit of emulation among those who are able to advance scientific education and research in this country by providing the necessary means.

THE well-known American naturalist, Mr. D. G. Elliot, and party left London for Somaliland on the 27th ultimo. The object of Mr. Elliot's expedition is to obtain a series of antelopes and other larger African mammals for the Field Columbian Museum of Chicago. Mr. Elliot had originally intended to go to Mashonaland for this purpose, but the recent troubles in South Africa induced him to change his plans. He will land at Berbera, and proceed southwards over the high plateau to the Shebeyli River, where he expects to find giraffes and Grévy's zebras. Mr. Elliot will endeavour to return to the coast by the

valley of the Juba River, in order to procure examples of the recently-described Hunter's antelope (*Damaliscus hunteri*). Mr. Elliot takes with him a taxidermist from Chicago, and has secured in London the services of Mr. Dodson, who accompanied Dr. Donaldson Smith during his recent adventurous expedition in Lake Rudolph.

THE Liverpool Marine Biological Station at Port Erin is now quite full. The naturalists who have gone there to work, for the Easter vacation, are Prof. G. Gilson (Louvain), Mr. Arnold Watson (Sheffield), Mr. E. T. Browne (University College, London), Prof. Weiss, Mr. Gamble, Mr. Burt, and Mr. Mellor (from Owens College, Manchester), Mr. Kermodé (Ramsey), Mr. Clubb (Liverpool Museum), Mr. C. E. Jones and Prof. Herdman (University College, Liverpool). Several students from University College, Liverpool, are expected later. The tides have been exceptionally low, the weather is good, and the Committee have arranged several dredging expeditions, one of which will be to the deep water between the Isle of Man and Ireland.

THE death is announced of Mr. George Holt, who endowed the chair of Physiology in University College, Liverpool, and contributed altogether about £25,000 to the resources of the College.

ONE of the New York medical colleges has already incorporated instruction in the use of X-rays in surgery as a part of its regular curriculum.

AMONGST the experiments on Röntgen X-rays made during the past month by Italian physicists, several contributions may be cited which either tend to confirm the results established by other workers, or to establish new results. Signor A. Roiti describes (*Atti R. Acad. Lincei*) a series of experiments now in progress bearing on the question as to where these rays emanate. The principal conclusions arrived at are: (1) That fluorescence does not necessarily accompany the emission of X-rays; (2) that the rays are only emitted when cathodic rays impinge on certain substances, notably glass, aluminium, mica, platinum, and porcelain. Signor Roiti establishes some interesting results relating to the leakage of electricity which takes place when X-rays fall on a charged body. When the body in question is placed in a vessel from which air is exhausted, this leakage effect is found to diminish rapidly after the pressure falls below a certain limit, showing that the leakage effect depends on the presence of molecules, by which electricity is conducted from the charged body to the containing vessel.

OUR American correspondent writes, under date March 27:—"Reports are received of the favourable action of the Senate Committee with reference to the proposed National University, preliminary appropriations being recommended for 1897 and 1898. This measure is one which has often heretofore been broached at Washington, and has been so often deferred as to seem to many a hopeless scheme. Present indications, however, point to some real progress, and encourage the hope that something will at last be accomplished.—Progress in science seems to pervade all departments of the Government. Another notable move is the introduction into the Post-office at Washington, of cancelling stamps which indicate every day the weather forecast, and of course the stamps are changed from day to day. This scheme will be put in operation within a few weeks.

"THE site selected for the new free public library of New York, which has recently been so amply endowed, including the Astor and Lenox libraries and the Tilden bequests, is that of the old reservoir on the corner of Fifth Avenue and West Forty-second Street. At a public hearing before the