

RESEARCH ITEMS

Fraternal Twins

J. W. MACARTHUR has made an analysis of the factors related to the production of fraternal twins (*J. Hered.*, 33, 87; 1942). He points out that body size of the animals is correlated with the number in the litter. For example, seven generations of mice selected for body size in a plus direction weighed 27 gm. and produced 9-10 in a litter, whereas selected in a minus direction they weighed 14 gm. and produced 5-6 in a litter. Similar evidence is recorded from other animals. Twins are more prevalent among Nordic people than in the Mediterranean region, and the author points out that stature is greater in the more northern parts of Europe. Similarly, Negroes in the United States have a twin rate of 1 in 69 births, whereas the Japanese have the lowest known figure of 1 in 301. Twinning is believed to be inherited through both male and female lines, and to be largely dependent on those genes which influence body size.

Coiling of Chromosomes

TRILLIUM species provide valuable material for observations on chromosome coiling, which is considered by many cytologists to be of fundamental importance. G. B. Wilson and I. Hutcheson (*Canad. J. Res.*, 19, 383; 1941) show that in *Trillium erectum* reversals in the direction of coiling across the attachment region are at random; across a chiasma there is a frequency of 1:6:1 of 0, 2 and 4 reversals in direction of coiling of the four chromatids. It is shown that there is an average of two reversals per chiasma. Reversals of direction take place without chiasma formation; once in approximately 17 gyres. There is thus, the authors contend, no grounds for a torsion theory of spiralization and no signs of an inherent ground pattern of structure that determines directions of coiling. A. H. Sparrow, C. L. Huskins and G. B. Wilson (*Canad. J. Res.*, 19, 323; 1941) have studied the length changes of the meiotic and mitotic chromonemata in *T. erectum* and *T. grandiflorum*. Elongation occurs between early diakinesis and anaphase I and between anaphase II and prophase of the microspore division. Contraction occurs between zygotene and diakinesis, between anaphases I and II and during microspore and prophase. The authors discuss prevailing theories and put forward the view that the coiling is brought about by elongation of the chromomata within a space confined by the pellicle. It is probable that spirals of sister chromatids are always in the form of orthospirals (plectomenic), that is, they are interlocked at each twist. The authors show the importance of this evidence in considering the mechanism of chromosome behaviour.

Pacific Foraminifera

J. A. CUSHMAN now publishes the third part of his work on the Foraminifera of the tropical Pacific collections of the *Albatross*, 1899-1900 (United States National Museum, Bulletin 161; 1942). This deals with the families Heterohelicidae and Buliminidae. Certain other related material from shallow water of the same region is also included. Some interesting relationships have been noted in these faunas, in which are living representatives of species known hitherto only from the late Tertiary of other regions. The number of distinctive species in this area is very large. Many were originally described by H. B.

Brady from the *Challenger* material. *Bolivinita quadrilatera* is a species occurring in the *Albatross* stations sometimes relatively abundantly, and also in 3-12 fathoms off Fiji. It apparently also occurs in the Atlantic, but it is an interesting fact that the Atlantic specimens as a rule seem to lack the basal spine. The fauna of the Miocene of France is related in many ways to the present Indo-Pacific fauna. It is therefore not surprising that a typical specimen of *Bolivinitella margaritacea* described from the Miocene of France should have been found in the material from Rutavu.

Biology of Beetles of the Family Dermestidae

MEMOIR 240 (Dec. 1941) of the Cornell University Agricultural Experiment Station is entitled "Studies on the Biology of Four Common Carpet Beetles". Part 1, dealing with three of the species in question, is by Grace H. Griswold, and Part 2, which is concerned with *Anthrenus scrophulariae* only, is by Margaret Greenwald. It appears that very little detailed work has been done on these important pests. The black carpet beetle (*Attagenus piceus*), the varied carpet beetle (*Anthrenus verbasci*) and the furniture carpet beetle (*Anthrenus vorax*) are widely distributed throughout the world. The larvae feed upon materials of animal origin and cause much damage to rugs, carpets, upholstered furniture, also woollens, furs, etc. The first two species also feed on cereal products and at times cause trouble in flour mills and granaries. In breeding these insects, woollen cloth of some kind has always been kept in each jar or receptacle and fish meal has proved satisfactory as a food for the larvae. In all three species several months are spent as larvae. For *A. piceus* the period was never less than 8 months and some individuals lived as long as 21 months. In the case of *A. verbasci* the larval life was slightly shorter but never less than 7 months, while in the case of *A. vorax* the period ranged from slightly less than 4 months to more than a year. The adult life in the first two species ranged from 13 to 44 days, whereas *A. vorax* lives as an adult from 44 to 251 days, the females living rather longer than the males. The fourth species, *Anthrenus scrophulariae*, may pass its entire developmental period (egg to adult) in 78 days, but may be prolonged to at least 439 days. The beetle itself feeds upon pollen of various flowering plants—at least twenty-seven species of these being known to be resorted to. The paper includes a list of more than a hundred references to works on the insects in question.

Selachine as a Colour Neurohumour in Sharks

G. H. PARKER read a paper on this subject at the annual general meeting of the American Philosophical Society during April 23-25. In the common bull-head, the darkening of the fish is due to intermedine from the pituitary and acetylcholine from dispersing nerve terminals near the colour cells, and the blanching to adrenalin from concentrating nerve terminals also near the colour cells. In the smooth dogfish *Mustelus canis* darkening is due to the pituitary neurohumour intermedine. The occasion of its blanching is less clear. This colour phase has been variously claimed as due to the mere absence of intermedine, to a pituitary blanching agent, the *W*-substance, or to a concentrating nervous neurohumour. No evidence in favour of a *W*-substance has been found in *Mustelus*, but this fish does blanch on

loss of intermedine. When its integumentary nerves are cut the denervated areas become pale. Such blanching is not due to a disturbance in the blood supply, for it occurs when the blood vessels of the region are not interfered with. Such pale areas can be revived by recutting their severed nerves. From such skin a neurohumour can be extracted with ether or oil that will blanch a dark fish locally on injection. This neurohumour is in effect like adrenalin, but it is not adrenalin for it is not soluble in water and it is not destroyed by heat. It is peculiar to the shark; hence it has been called selachine. It causes blanching in *Mustelus* when the fish is low in its intermedine.

Water Reserves in Brazilian Forest Soils

THIS feature of some of the soil in the vast forest areas of Brazil is emphasized by Felix Rawitscher in his transpiration studies by rapid weighing methods under field conditions (*Anais da Academia Brasileira de Ciencias*, 14 (1), 1942). The soil depth in tropical and sub-tropical regions may reach a maximum of 15–20 metres, and considerable water reserves may be accumulated in the deeper layers of soil. During the dry period of the year these furnish water, not only to sources and streams, but also to the deeper plant roots. Large zones of humid forests in the interior of San Paulo live on these reserves during the dry period. The author suggests that the high transpiration rate of extensive humid forests must have a considerable influence on the humidity of the climate.

Amber Spiders

A. PETRUNKEVITCH'S well-known monograph on Carboniferous Arachnida is now supplemented by a lengthy study of spiders preserved in Baltic amber (*Trans. Connect. Acad. Arts. Sci.*, 34, 119; 1942). The 140 specimens named represent 78 species, 69 of which are new, included in 27 families, 5 new. The descriptions are as detailed as the state of preservation allows, aided by a special technique, a full account of which is given. The work is illustrated by more than 500 line figures and 100 photographs. Prof. Petrunkevitch also summarizes the changes that evolution seems to have wrought in the structure of spiders, especially in the circulatory and respiratory systems, leading first to the conclusion that the habits of spiders must have become differentiated before the Oligocene, and secondly to much discussion as to the most acceptable way in which these evolutionary trends may be represented in the classification of the order. The monograph is both informative and provocative to a degree.

High-Pressure Measurements

Two further instalments of P. W. Bridgman's researches on the physical properties of substances at high pressures have been published (*Proc. Amer. Acad. Arts and Sci.*, 74, 399 and 425; 1942). The first deals with freezing parameters and compressions of twenty-one substances, chiefly organic liquids, up to 50,000 kgm./cm.². The general conclusion from this new work in a pressure range three or four times the previous range is that the melting curves give no evidence for critical point, maximum temperature or temperature asymptote. The curves continue to rise to indefinitely high pressures and temperatures, with continually decreasing slope $d\tau/dp$ and continually decreasing volume, discontinuity between solid and liquid. The second paper deals with pressure-volume relations for seventeen elements to

pressures of 100,000 kgm./cm.². In general the compressibility falls off less with rising pressure than might have been expected. Full details are also given of the experimental technique needed to overcome the special difficulties of working at these higher pressures.

The True Galactic Pole

O. R. WALKEY has prepared an account of the various positions found for the galactic pole from the days of Sir William Herschel down to modern times (*Observatory*, No. 808, 64; June 1942). Of the twenty positions determined, seven were derived by the galactic belt, four from star counts, and nine from galactic objects. These are tabulated and are all reduced to the epoch 1900 position. The true position of the galactic north pole, using all the results, is at R.A. 12h. 48m., Dec. + 27°, in Coma Berenices (epoch 1900), and it is remarkable that this coincides exactly with Newcomb's combined position tabulated for the galactic belt. It seems highly probable that the epoch 1950 co-ordinates will be in use after the next meeting of the International Astronomical Union, in which case it will be sufficiently accurate to adopt the 1950 R.A. as 12h. 50m. and Dec. as + 27°.

Solar Eruption and Magnetic Storm of March 1-2, 1942

A PROBABLE connexion between the intense solar eruption of February 28d. 12h. and the magnetic storm which followed has been demonstrated by H. W. Newton (*Observatory*, No. 808, 64, June). M. A. Ellison at Sherborne observed the eruption first on Feb. 28d. 12h. 42m. U.T. in $H\alpha$, and from the presence of descending dark flocculi near the bright emission he inferred that the eruption had been in progress for some time. Observations were also made by P. Laurie with the Greenwich spectrohelioscope, but a cloudy sky prevented observations in the earliest stage of the eruption. While the average duration of a brilliant eruption is about $\frac{2}{3}$ hour, the eruption of Feb. 28 lasted for more than $3\frac{1}{2}$ hours—an exceptional time; but it is suggested that it may have consisted of multiple eruptions with the greatest integrated intensity between 12h. 0m. and 12h. 47m., and strong evidence for this view is given in the paper. On Feb. 28d. 12h. 0m. there was a sudden fade-out (ionospheric irruption of the Dellinger type) and this continued on some circuits until 20h. This was an abnormal duration for a fade-out of this type. A great magnetic storm commenced $19\frac{1}{2}$ hours after the beginning of this sudden fade-out and the following figures from the Abinger magnetic traces show the intensity of the storm:

D	9° 48' 7"	at 1d. 9h. 30m. to 11° 14' 8"	at 1d. 7h. 51m.
H	0.18194	1 8 50	0.18706 1 9 59
V	0.43048	2 1 45	0.43224 1 9 59

These are the extreme ranges in each case.

Assuming that the ejection of the stream of corpuscles occurs about the time of peak intensity of the bright eruption, which is also closely indicated by the beginning of the radio fade-out, the time required by the stream to reach the earth was 19.4 hours. The data for Sept. 17–18, 1941, gave 20.5 hours and those for Feb. 28–March 1, 1941, gave 18.5 hours. Statistical evidence suggests that in the case of intense magnetic storms in areas where spectroscopic observations have located a brilliant solar eruption within the preceding $1\frac{1}{2}$ days, the effective time of travel is shorter than the mean.