RESEARCH ITEMS.

On a Characteristic Property of Trigonometrical Polynomials.—Markoff (*Comp. Math.*, **3**, Fasc. 3, 305–309) has proved the following theorem about periodic continuous functions. Let $f(x)$ be a function with period 1 (and continuous). Then only the following two cases are possible: either the sum $\sum_{k=1}^{n} f(k\,\alpha)$ considered as a function of n is bounded for every irrational α, or the set of values of α for which the sum is bounded form a set of the first catagory; and if the first case is ture, then

$$f(x) = \sum_{-N}^{N} a_k e^{2\pi kix} \text{ with } a_0 = 0$$

and in the second case no such representation is possible. The proof is elementary and is brought about by a series of lemmas of which the following are the leading ones:

Lemma 1. If under the same conditions as above $\left|\sum_{k=1}^{n} f(k\alpha)\right| \leqslant C$ for some irrational α, then $\left|\sum_{k=1}^{n} e^{2\pi mki\alpha} \int_0^1 f(x)\,e^{-2\pi mix}\,dx\right| \leqslant 2\,C$ and $\int_0^1 f(x)\,dx = 0$. (The latter part follows when we observe that $k\alpha - [k\alpha]$ is uniformly distributed in 0, 1.)

Lemma 2. Under the same conditions $\left|\frac{1}{1 - e^{-2\pi mi\alpha}} \int_0^1 f(x)e^{-2\pi mix}\,dx\right| \leqslant 2C$ and

Lemma 3. If under the same hypothesis $\int_0^1 f(x)\,e^{-2\pi kix}\,dx \neq 0$ for an ∞ of k's, then the set of values of α for which the sum is bounded is of the first category. With the proofs of these three lemmas the theorem follows.

K. V. I.

Development of the Male Gametes in Angiosperms.—Poddubnaja-Arnoldi (*Planta*, 1936, **25**, 502–529) studied the development of the male gametes in some angiosperms with a view to find an answer to the following questions: (*a*) whether the male gametes are merely naked nuclei or cells, (*b*) whether the vegetative nucleus persists or undergoes an early degeneration (thus being of importance for the growth of the pollen tube or not) and (*c*) whether the nuclei in the tube have an independent movement of their own, or are merely carried passively by the streaming of the vegetative plasm? These questions are of considerable importance and it is, therefore, necessary to consider Mrs. Poddubnaja-Arnoldi's conclusions rather critically.

She describes sperm *nuclei* (and for most of these species also a naked generative nucleus) in *Cannabis sativa* L., *Aconitum lycoctonum* L., *Papaver somniferum* L., *Crepis capillaris* (L.) Wallr., *Taraxacum koh-saghyz* Rod., *Allium cepa* L., and *Secale cereale* L. No mention is made of the investigations of Golinski (1893) and Osterwalder (1898), who, contrary to her own observations) had seen sperm *cells* in *Secale cereale* and *Aconitum napellus*! She herself admits, however, that it is very difficult to obtain a good fixation for the male gametophyte and the reviewer can say from his own experience that the aceto-carmine method, which she preferred to use for the most part, may have led her to erroneous conclusions.

The same thing must be said with regard to her statement about the degeneration of the vegetative nucleus. It must be emphasised that only the Feulgen reaction can enable definite conclusions on the question whether the vegetative nucleus has degenerated or is still present. It may be admitted, however, that the vegetative nucleus does not now appear to be so extremely necessary for a normal germination of the pollen grains, as was thought before. As to its movement the author supposes that it is a passive one.

Generative and sperm cells are described in two species, *Pisum sativum* L., and *Nicotiana rustica* L. Pollen of these species as well as of *Secale cereale* was treated with X-rays (1000–80,000 "*r*"). At lower radiation forces the generative nuclei divide irregularly and form "Mikrospermien" or take a bicuit-like shape. At higher radiation forces the division does not take place at all and the generative nucleus shows a homogeneous or otherwise changed structure. Due to their incapability for division the author concludes that the generative nuclei are killed in these cases. The protoplasm, however, seemed to have remained unaffected by the radiation, since the tubes were still growing quite normally. Though killed by the radiation (if we are to accept the opinion of the author), the generative cells of *Pisum* and *Nicotiana* and the sperm cells (Golinski:) of *Secale* were able to enter the pollen tube. From this it is inferred that the male gametes have no independent power of movement but are carried along passively.

To this conclusion must be raised the following objections: (1) the author only showed that the generative nuclei do not divide after radiation and not that they were necessarily dead, and that (2) an active movement of the generative cell would really depend far more on the activity of its plasm than of the nucleus within it. The author herself shows that the vegetative plasm behaves quite normally after radiation and it would seem reasonable to conclude that the same is the case with the generative plasm. Just for that reason alone, it would seem possible that the generative cells continue to move independently in spite of the changed (not killed!) nuclei. Even if we were to admit that the generative or sperm nuclei are naked, the possibility of their being able to move independently cannot be denied, for the author only proved their incapability to divide; it does not necessarily follow that they also lost their power of movement and had to be carried by the streaming of the vegetative plasm!

H. D. WULFF.

The Influence of Moonlight on the Activity of Certain Nocturnal Insects, particularly of the Family Noctuidae, as indicated by a Light Trap.—Since he came over to Rothamstead from Edinburgh in 1932, Dr. Williams has been chiefly engaged in studying insect activity in relation to climatic and weather conditions. His method of insect collection has been by means of a light trap, redescribed by him recently in its improved form (*Trans. Roy. Ent. Soc.*, 1935) its chief feature being a clockwork arrangement by which the time of entry of an insect into the trap can be estimated. The captures made by this trap were used to test the popular belief that insect activity, at least in certain groups, particularly Lepidoptera, decreases on moon-lit nights, this decrease being especially noticeable in those insects that are attracted to light. (Williams, *Phil. Trans. Roy. Soc., Lond.*, (B), October 1936.)

For this purpose moonlight was measured by a photographic instrument which produced a line image of the moon by means of a cylindrical lens focussed on to a strip of a sensitive paper. As moonlight is considerably affected by the presence of clouds in the sky this factor was also measured by means of a long focus camera which photographed the pole star and the tracings of its image on a sensitive paper gave a measure of cloudiness each night.

Dr. Williams' finding is that there is a distinct lunar effect on insect captures at night; fewer insects coming to the trap on moon-lit nights than on dark ones. Whether this is due to the fact that a moon-lit night being a clear night is cooler and not many insects are flying about owing to this fall in temperature or that the moonlight is competing with the artificial light of the trap and reducing its efficiency is a point that is not definitely answered in the paper. Dr. Williams inclines to the view that the effect of moonlight is at least partly physiological since it differs in different groups of insects without any reference to their time of flight but promises to settle the point by further work, using a method of insect collection which has not to depend on light as an attraction. Incidentally this will also widen the range of the investigation by making it possible to study the reactions of certain other insects that are not positively phototropic.

K. B. LAL.

Chromosomes of Ant-lions.—In a paper entitled "The chromosomes of six species of Ant-lions (Neuroptera)" published as contribution No. 106, November 1936, from the Zoological Institute, Faculty of Science, Hokkaido Imperial University, Japan, J. J. Asana and Hisao Kichijo have recorded their investigations on the chromosomes of six species of Neuroptera from India.

Our knowledge of the chromosomes of this interesting group of insects is of very recent growth. In the year 1932 Oguma and Asana[1] published a report on the chromosomes on an Indian species of Palpares. Since then considerable advance has been made by other investigators among whom the work of Naville et de Beaumont[2] has thrown much light on the establishment of systematic relationship of the chromosomes between allied orders. So far as the litereture shows, the chromosomes of Neuroptera have been investigated in 33 species covering eight families. All the authors are in agreement that in the species they have studied the male is heterogametic, the male sex cells are of the usual two types, the X- and Y-bearing complexes. Again, the two components of X–Y complex among all these species show a striking uniformity in their behaviour at the time of reduction division. They show a remarkably precocious separation in contrast to the behaviour of the autosoma tetrads at this stage of spermatogenesis in Neuroptera.

The numerical relation between the chromosomes of six species of ant-lions from India is given in the following table:—

Species	Haploid	Diploid	Sex-chrom
(*a*) Myrmeleonidæ—			
1. Myrmecælurus sp. (*M. acerbus*?) ..	7	14	XY
2. Macronemurus sp.?	8	16	XY
3. Neuroleon sp.	8	16	XY
4. Myrmeleon sp. (*M. sagax*?) ..	7	14	XY
(*b*) Ascalaphidæ—			
5. *Ogcogastor segmentator* ..	..	22	XY
6. *Glyptobasis dentifera* ..	..	22	XY

[1] Oguma, K., and Asana, J. J., *Journ. Fac. Sci. Hokkaido Imp. Univ.*, 1932, Ser. VI, **1**.

[2] Naville, A., et de Beaumont, *Arch. d'Anat. Microsc.*, **T. 29**.