

injudicious application of molasses either as such or with diluted water to the soil would lead to profuse growth of fungi, which would not only lead to soil sickness but also perhaps attack the cane growing thereon.

In the foregoing columns we have only outlined some of the more important problems that now face the sugar industry in the country. Factories are springing up everywhere at a rapid rate and it is not unlikely that, before long, some of the problems may become highly acute. It is suggested, there-

fore, that while conditions are still favourable the Government should take the initiative in the matter and appoint a competent committee to go into the above and related problems and advise them with regard to the best means of dealing with them. It is not too much to hope that by the adoption of such a wise and far-sighted policy, India will not only have stable sugar industry of her own, but will also, before long, be one of the foremost sugar exporting countries of the World.

### Research Notes.

#### Peach Yellows and Sandal Spike.

IN a recent paper (*Contrib. Boyce Thompson Ins.*, 5, 19, 1933) Dr. L. O. Kunkel shows that peach yellows is transmitted by the leafhopper *Macropsis trimaculata*, and not by several other suctorial insects with which transmission experiments were tried. The obvious inference is that *M. trimaculata* is the specific vector of peach yellows.

This result is of considerable interest as the vector of this virus disease, like that of sandal spike, has eluded prolonged investigation. Moreover, with sandal spike, peach yellows was at one time regarded as being due to unbalanced sap circulation, a theory which continued in certain quarters because the vectors of these diseases were unknown. The case of peach yellows has also been cited as an argument against the hypothesis (Dover, *Ind. For. Rec.*, 17, 1, 1932) that sandal spike is transmitted by a specific suctorial vector belonging to the Jassidæ, in which group the vectors of other yellows diseases, such as Aster yellows, are included. It was said that "The fact that other diseases are carried by sap-sucking insects does not form a sound argument for extending the analogy to spike-disease. There are several diseases of the virus group, in fact, which have not been transmitted by sucking insects. Peach yellows and peach rosette are typical instances in point." According to Quanjer (*Phytopathology*, 21, 577, 1931), however, the yellows diseases are characterized by the fact that they are transmitted only by grafting and by specific suctorial vectors (never by mechanical sap inoculation), peach yellows and sandal spike being regarded as exceptions to the rule, as they had been transmitted by grafting but not by

insects. Dr. Kunkel's work, therefore, not only definitely identifies peach yellows with the other yellows diseases, but provides indirect support for the contention that a specific suctorial vector is also responsible for the transmission of sandal spike, the remaining exception in the yellows group of viroses.

The success which has attended Dr. Kunkel's studies on peach yellows, and his work on other yellows diseases, should provide much encouragement and inspiration for those engaged on the problem of sandal spike. Patience and a critical attack have conquered the most elusive problems offered by virus diseases, and there is every reason to suppose that the sandal spike problem is susceptible to the same approach. In fact the information already available suggests that it will not be long before the cause of sandal spike is positively determined.

CEDRIC DOVER.

#### The Origin of Granite Magmas.

THE recent paper by P. Eskola (*Miner. und Petrogr. Mitteil*, 12, Nos. 5 and 6, 1932) forms an important contribution towards the solution of the controversial problem of the origin of granitic magmas. From his intimate knowledge of pre-Cambrian massifs, he discusses the possibility of reconciling the two apparently opposed facts—"the downward increase in the amount of granite in the upper parts of the earth's crust and the downward increase of basicity in the globe as a whole." His conclusions may be briefly summarised as follows: "(1) The sial crust (a) originated mainly by crystallization-differentiation allied with partial



(selective) re-fusion and squeezing out of substance from older rocks and (b) has gradually thickened during geological ages. (2) The downward increase in the amount of granite is due to its magma-tectonic origin—the magma originating in the roots of orogens and for the most part, solidifying there; whereas the reduced amount of granite near surface is due to the rise of basic material into the upper zones of the orogens, and to large-scale intrusions of basic lava in the kratogens." Eskola does not believe that a granite could originate from a basic silicate magma like that of plateau basalt by a process of crystallization-differentiation, as suggested by Holmes. Eskola's considered opinion on the problem of the origin of magmas is that "in the formation of the Earth's lithosphere, differentiation (preferentially by the squeezing out of fluid from crystal mesh) was most effective in the earliest stages, whereas palingenesis may have played a more important rôle during the later orogenic periods."

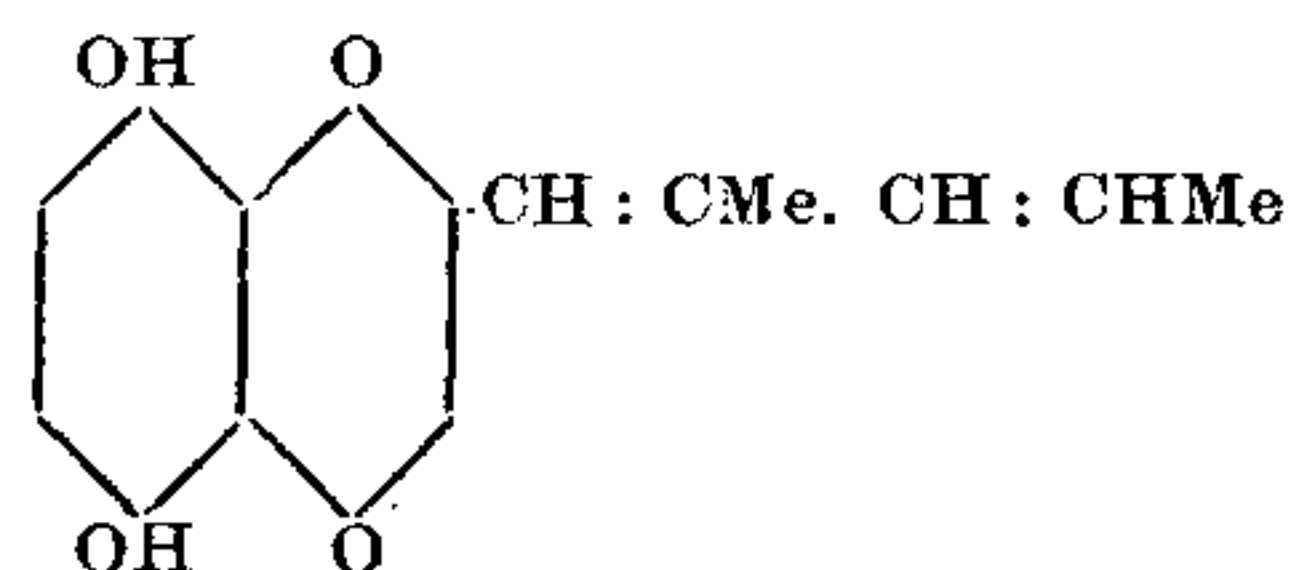
#### A New Constitutional Formula for Alkannin.

ALTHOUGH attempts have been made since 1833 to study the composition and constitution of alkannin—the important colouring principle of alkanet root—sufficient reliable data which would indicate to a correct formula are yet wanting. Its composition has been given by various investigators, as  $C_{17}H_{10}O_4$ ,  $C_{35}H_{20}O_8$ ,  $C_{15}H_{15}O_4$ ,  $C_{15}H_{12}O_4$  and  $C_{30}H_{28}O_8$ .

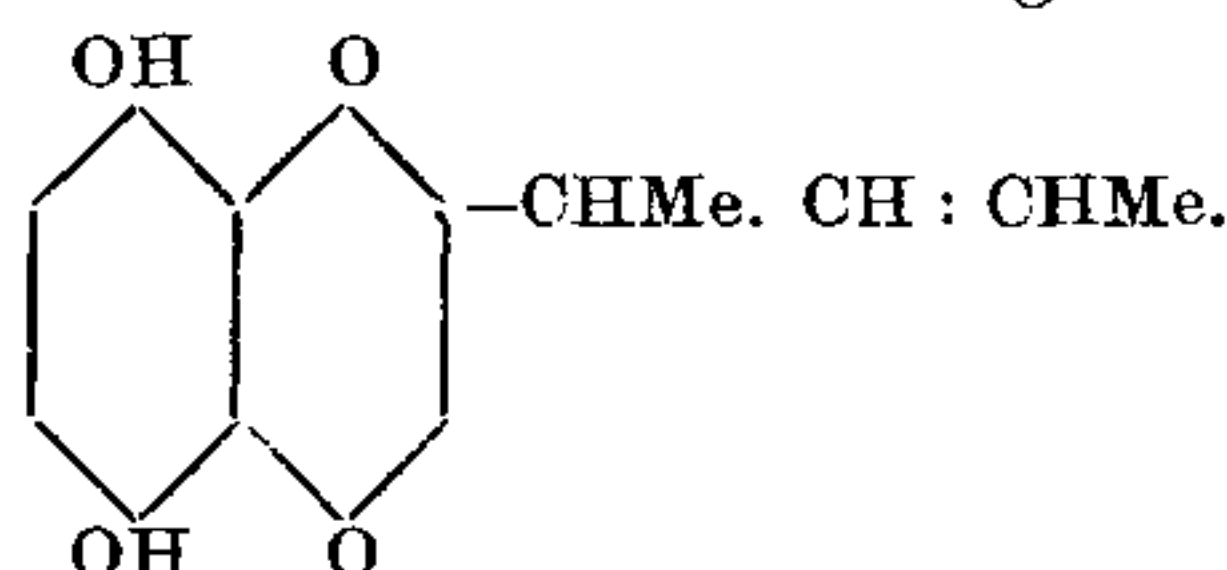
M. V. Betrabet and G. C. Chakravarti (*Proc. Ind. Sci. Cong.*, 1930, p. 181; 1931, p. 166; *J. Indian Inst. Sci.*, 16A, pt. 4, 41, 1933) have suggested a new formula for alkannin. Unlike the previous workers, they subjected alkannin to an exhaustive purification through its acetyl derivative and gave  $C_{15}H_{13}O_4$  as the empirical formula. Molecular weight determinations showed that the actual formula was double that of the empirical one and was  $C_{30}H_{26}O_8$ . The formation of a tetra-acetyl-, tetra-benzoyl-, dimethoxy-, dimethoxy-dibenzoyl-, and dicarbethoxy-, derivatives showed definitely the presence of four hydroxyl groups—two phenolic and two alcoholic. Oxidation experiments yielded oxalic and succinic acids along with two nitro-compounds and a neutral body. Distillation with zinc dust gave  $\beta$ -methyl-anthracene.

From the molecular weight of a tetra-acetylleuco-alkannin and from the formation

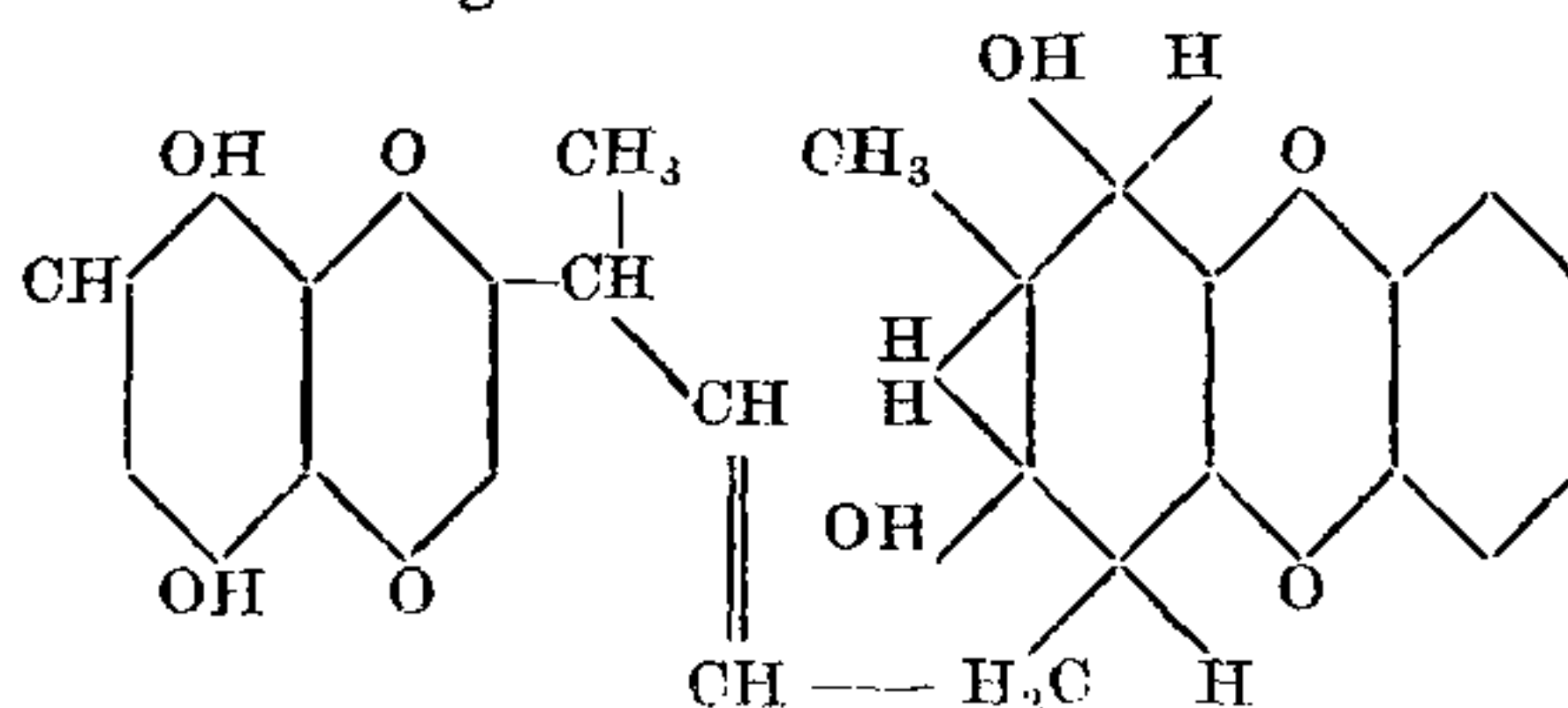
of naphthazarin on distillation of alkannin *in vacuo*, Raudnitz, Redlich and Fiedler (*Ber.*, 64, 1835, 1931; cf. Raudnitz, *ibid.*, 65, 159, 1932) suggested  $C_{16}H_{14}O_4$  as the molecular formula having the following constitution:



Lieterle, Salomon and Nosseck (*Ibid.*, 64, 2086, 1931) ozonised alkannin in chloroform and got a dihydroxynaphthaquinone-dicarboxylic acid. They assigned  $C_{15}H_{14}O_4$  as the formula with the following structure:



Betrabet and Chakravarti (*loc. cit.*) have correlated the whole data and suggested the following constitution:



Big as the molecule is, it is very difficult to say that this is the constitution. A larger number of degradation products have to be studied. The authors say that further experiments on these lines are in progress. The results of these investigations should be very welcome to "structural chemists".

#### Anisotropies in Paramagnetic Crystals.

IN continuation of the work briefly described in a previous issue of this Journal (*Curr. Sci.*, 1, 239, 1933) Krishnan, Chakravarty and Banerjee have extended their investigation to paramagnetic crystals, and in *Phil. Trans. Roy. Soc.*, A 232, 99, 1933, they give a detailed report of the results of measurement on a large number of paramagnetic sulphates and double sulphates. The measurements seek to remove the discrepancies between various observers. The work of Jackson



(*Phil. Trans.*, 224, 1, 1924; 226, 107, 1927) is discussed in detail and some errors introduced by neglecting the signs of the couples acting on the crystal cylinders employed by Jackson are corrected. Details of the method employed by the authors are given; in the main the method is similar to that used by them in the case of diamagnetic crystals. A comparison of their results with those of others is also given. Among the crystals studied manganese ammonium sulphate was found to have the smallest anisotropy; the smallness of anisotropy is in agreement with what is to be expected from theory. Further work on the variation of the susceptibilities of some of the crystals at low temperatures is also reported to be in progress.

#### Unit Characters in Fossils.

IN a recent number of the *Proceedings of the Cambridge Philosophical Society*, 7, 4, 1933, H. H. Swinnerton has published a paper on what he calls the "unit characters" in fossils. He mentions that the palaeontologist can often trace such a "unit character" in any particular group of fossil organisms through successive periods of time, and as such he finds it of great value in working out evolutionary series. "The peculiarities of the unit characters are: (1) the unit character undergoes serial change, both in development and evolution, (2) serial change in development is parallel to that in evolution, (3) the time of onset of a character and of its successive phases of change varies in different individuals and changes progressively in successive communities, (4) the rate of change in expression of a character varies in different individuals, but becomes progressively more rapid in successively later communities, (5) unit characters behave independently of one another."

#### The Feeding Mechanism of Branchiopoda.

PROF. H. G. CANNON in an interesting paper (*Phil. Trans.*, B. 222, 1933) describes the feeding mechanism in the four orders—Anostraca, Lipostraca, Cladocera, Conchostraca and Notostraca of the sub-class Branchiopoda. The order Lipostraca is particularly interesting since it is only represented by a fossil form *Lepidocaris*. According to Prof. Cannon, from a structure like the gnathobase of *Lepidocaris*, the gnathobases of all the

orders enumerated above except Notostraca, could be derived. In describing the possible line of evolution of the filtering trunk limbs in the five orders, he points out how in the original Branchiopod the anteriorly directed food stream developed secondarily and therefore it is not an effective mechanism. Consequent on the increase in the size of particles and decrease in the effect of suction, the basal endites become modified along two lines, into structures of greater efficiency. On the one hand the Notostracan apparatus with endites projecting forwards and with no food grooves was evolved, while on the other, an apparatus with endites projecting backwards was formed in Anostraca, Cladocera, Conchostraca and Lipostraca. In these latter groups, filter setae were developed and therefore the endites functioned both as food procuring and filtering agents. These are called sinuognathobases. Further Prof. Cannon points out that the proper functioning of the Branchiopod phyllopodium (or the ultimate filtering limb) depends on the backwardly projecting exites, endopodites and endites from the thickened corm. He suggests that together with the body wall at the base, the shape of the limb is that of the bath and therefore the word 'droitopod' may be substituted

#### The Study of Golgi Elements.

LAURA J. NAHM (*Journal of Morphology*, 54, 2, 259, 1933) arrives at some very interesting conclusions believed to be of value in at least a partial clarification of the confusion which exists among modern investigators concerning the morphology, chemical composition and the functional significance of golgi elements and her results are not in accord with the existing theories of morphology and functional significance of the golgi apparatus. The golgi elements of fixed cells and the neutral red vacuoles of vitally stained cells are not constant morphological cell constituents but are the visible products of chemical reactions that occur in the cell. Neutral red reactions in the gland cells of a number of vertebrates show that the neutral red is not a specific stain and the capacity to stain with this vital stain depends on the kind and physiological state of the cell and the presence of acidic substances. The capacity to reduce osmic acid is not a specific property of any morphological element of the cell. The impregnation of salts is conditioned



by the chemical constituents of the protoplasm and vary with the quality of initial fixation and temperature of incubation. The materials that give rise to the so-called golgi are probably unsaturated fatty acids which may be present in cells at the time of fixation or may be formed during the process of impregnation from materials which were present in the living cells.

#### Basophil (Mast) Cells in the Alimentary Canal of Salmonoid Fishes.

LLOYD L. BOLTON (*Journal of Morphology*, 54, 3, 549, 1933) has described basophil (mast) granule cells in the connective tissue throughout all the regions of the alimentary canal of Salmonoid fishes. Various theories and problems arising from the consideration of these cells have been briefly reviewed. The granule-bearing cells are mostly basophilic. Since their origin is traced to a more or less mesenchymal type of cell, it is contended that they are to be interpreted as connective tissue mast cells. The author finds no support to the suggestion that these cells are of the nature of secretory leucocytes and their presence in the tissue of the alimentary tract is without reference to the functional activity of the digestive canal. Further the mast cells do not show any obvious morphological change to be synchronised with the variations in the functional conditions of the tract. Their enormous number and the remarkable uniformity of appearance under varying conditions suggest that they may be degenerative cells with a probable function related to food storage. The mast cells exhibit amoeboid movements and are found commonly between the crypts of the glands of the stomach and come into close relationship with the gland cells. The spherical granules contained are not lipoid in nature as they are not preserved by osmic acid and a protein composition is suggested as they are readily preserved by mercuric chloride. In living cells the granules are probably fluid and are interpreted as histogeneous mast cells.

#### Dahlia Diseases.

AMONG the valuable contributions of the Boyce Thompson Institute (5, No. 2, Philip Brierley's comprehensive study of Dahlia Diseases will greatly interest those interested in virus diseases of plants.

Dahlia mosaic is suspected to be widely distributed and all the members of the genus *Dahlia* tested have proved susceptible but no suspects have been found outside this genus.

The symptoms of the mosaic are chlorotic bands following the veins, leaf distortion, shortening of internodes and flower stems and vein necrosis. Great variation appears in the reactions of different varieties, the more tolerant varieties showing only chlorotic symptoms. The disease is not known to disseminate through seeds, nor has the virus been transmitted by mechanical methods. Grafting, however, is a successful means of disease transmission and the diverse symptoms exhibited by tolerant and intolerant varieties are merely varietal reactions to one mosaic.

*Myzus persicae* has been shown to be a vector of dahlia mosaic; other insects, experimented with, have so far not been able to transmit the virus.

The interval between infection and manifestation of symptoms is usually four to six weeks, but in some cases much longer. Late season infections in particular tend to show symptoms after a long interval, often not until the following season. The expression of symptoms in mosaic plants is often delayed in early season growth. The chlorotic symptoms of mosaic are frequently masked during the growing season. It is suggested that masking is determined by growth relations rather than by any single environmental factor.

Dahlia is not a preferred food plant of *Myzus persicae* in early summer. Limited evidence suggests that some infections take place in July, and that more occur in September and October.

The rate of spread of mosaic in the field has been found to be of the order of 10 to 25 per cent. per year at Yonkers and New York.

Control of mosaic by selection and isolation of disease-free plants, supplemented by control of aphids during the period of greenhouse propagation and roguing, is recommended. Tolerant varieties affected with mosaic should be segregated from the healthy stocks, if grown at all.

Dahlia ring-spot is generally distributed in Connecticut, New Jersey, and southern New York, but has been found in high percentages in a few localities only. This disease has been transferred by grafting but



not by mechanical methods. The relation of ring-spot to mosaic is discussed.

Yellow ring-spot, seen only in dahlias received from Utah, has been transmitted by grafting but not by mechanical methods.

Oakleaf is tentatively described as a fourth virus disease of dahlia solely on the basis of symptoms expressed. None of the four virus diseases of dahlia, described in the paper, has been connected with other known virus diseases.

#### A New Blood Fluke from an Indian Tortoise, *Trionyx gangeticus*.

In the *Journal of Helminthology* (Vol. XI, pp. 163-68) Dr. G. S. Thapar describes a new genus of blood flukes from an Indian tortoise from Lucknow. The genus is named *Tremarhynchus* and belongs to the sub-family *Haplotremine* Stunkard, 1921. Several forms have already been described from the tortoises in the West under two genera *Haplotrema* and *Haplorhynchus*, but this is the first record of the occurrence of the hermaphroditic blood flukes from India belonging to this sub-family. The author describes its anatomy in detail and concludes with a discussion on the systematic position

of the new genus. The genus is interesting in several ways, particularly so because it shows its affinities with both of the known genera of the sub-family *Haplotremine* and thus serves as a sort of connecting link between them.

#### Spermatogenesis of *Gecko japonicus*.

SU-HSUEN WU (*Journal of Morphology*, 54, 3, 593, 1933) in his study of the Spermatogenesis of the *Gecko japonicus* offers evidence in favour of telosynapsis and the duality of the chromosomes from synizesis to diplotene is the result of a longitudinal split in the chromosomes joined end to end. There are twenty tetrads in diakinesis and the chromosomes assume a rod-shape at metaphase. The movements of the chromosomes in the first division which is the reducing division are not synchronous. There is no interphase between the first and second divisions and the movements of the chromosomes in the latter division are synchronous. An unequal pair of chromosomes (heterochromosomes) is found in early metaphase and generally lags behind the others forming the equatorial plate. The haploid number is 20.

### Science News.

The celebration of the Centenary of the Entomological Society of London on the 3rd, 4th and 5th May was marked by the announcement that His Majesty has been graciously pleased to grant the Society the privilege of being henceforth known as the Royal Entomological Society of London.

The Entomological Society was founded on May 3, 1833, when a few British naturalists met in J. G. Children's rooms in the British Museum, Bloomsbury.

The Centenary celebration included a first class display of modern entomological exhibits together with interesting volumes of the Society's library which included hand-painted figures of insects and the Society's obligation book containing the signatures of such distinguished fellows as Kirby, Darwin, Wallace and Bateson. Numerous charts, photographs, models and drawings gave one a magnificent idea of the different aspects of entomology. Both the academic and economic aspects of the subject were well represented. The exhibition indicated the lines of the rapid advancement of this important branch of science to which the Society that organized it contributed not a little.

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H. E. Sir Fredrick Sykes, the Governor of Bombay, opened on the 7th July, the University Conference at Poona, which was presided over

by Dewan Bahadur S. T. Kambli, Minister for Education. In the course of his remarks, His Excellency said that it was time that the Bombay University should be relieved of some of its numbers which were growing almost to unmanageable size and showed no signs of diminishing in the near future. There can be two types for new Universities; one is the regional and the other, residential. The difficulty lay in preventing these Universities from becoming centres of disruptive forces engendering a narrow, commercial outlook full of racial and linguistic prejudices. Whatever be the type of University that may be created the initiative must come from the people. The Government with its difficult financial position, can offer but very little help. Its immediate duty was to restore the grants in full for secondary education.

We believe that there is a great future for Maharashtra University which aims to express Maharashtra Culture. In such a case, Poona would be eminently suited for its centre and the existing Women's University would then be absorbed in the new one. While finance is the greatest obstacle to any immediate realization of this aim, it should, however, be emphasized that if the new University becomes a copy of the existing types turning out innumerable graduates every year whose future is a problem both to them and to the country, it had better