southern hemisphere and in the tropical regions are often devoid of yellow spots (Arginæ, Aulacidæ, Trigonalidæ, Stephanidæ, Evaniidæ, Pelecinidæ, Trypoxyloninæ and Vespidæ of the genera *Zethus*, *Montezumia*, *Icaria*, *Polybia*, etc.). Among aculeate Hymenoptera, the genera with strongly petiolated first abdominal segment are usually without yellow spots; whereas it can be said tentatively that the Sphecidæ and Vespidæ with bright yellow spots on the abdomen should be generally referred to forms with sessile first abdominal segments.

JEAN LECLERCQ

Laboratories of Biochemistry,
University of Liège.
Oct. 11.

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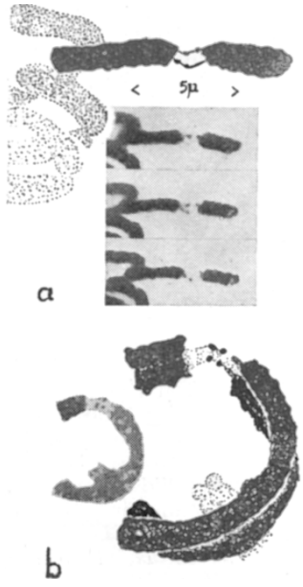
## Quadruple Structure of the Centromere

PRE-TREATMENT with 8-oxyquinoline (0·002 mol. per litre for four hours) of root meristems followed by squashing in acetic orceine gives chromosome pictures of exceptional clearness. The chromosomes are contracted as after cold or *c*-mitotic treatment. At the same time the metaphase chromosomes remain in their original position within the equatorial plate, although the spindle does not interfere with their spreading at the squashing. Satellites and secondary constrictions are conspicuous, and help the analysis of idiograms. Prophase chromosomes often show heterochromatic differentiations. The knobs of rye chromosomes are made quite conspicuous in mitotic prophase.

The centromeric gap is unusually wide, and it often exhibits distinct centromeric chromomeres. From early prophase up to metaphase there are found four such centromeric chromomeres, generally forming a square or a parallelogram in the centromeric gap. The accompanying figures (*a*) and (*b*) show this condition in *Allium cepa* and *Scilla sibirica* respectively. At anaphase and telophase only two centromeric chromomeres are seen, their division not yet having been accomplished.




One chromosome (*a*) of *Allium cepa* (at three different foci), and (*b*) of *Scilla sibirica* (drawing and microphotograph)

The type of structure described here has been demonstrated with our technique in species of the following genera: *Tradescantia*, *Scilla*, *Lachenalia*, *Hyacinthus*, *Allium*, *Sauromatum*, *Amorphophallus*, *Hæmanthus*, *Vallota*, *Amaryllis*, *Crinum*, *Cyrtanthus*, *Nerine*, *Hordeum*, *Secale*, *Triticum*, *Triticale*, *Vicia*. There seems to be a correlation in size between the chromosomes and their centromeric bodies; thus, the centromeric chromomeres were largest in *Scilla*, smaller in *Allium* and *Hordeum*. In species with small chromosomes we have so far been unable to detect any centromeric bodies, possibly because the chromosome contraction effected in such chromosomes is too strong. Thus *Vicia faba* presented centromeric bodies, whereas *Vicia cracca* with its much smaller chromosomes did not.

The results mentioned here give a new aspect to the view of the centromeric apparatus as a structure that is doubled in the longitudinal direction, earlier demonstrated with other techniques by Östergren[1], Lima de Faria[2] and Levan[3].

JOE HIN TJIO

Zaragoza, Spain.

ALBERT LEVAN

Sveriges Utsädesförening,
Svalöf, Sweden.
Oct. 5.

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## Colour-Contrast Phase Microscopy

THE possibilities of utilizing the differential chromatic effects of the Rheinberg ring method of illumination, which was later developed into the optical staining principles of Kraft[1], in conjunction with phase-contrast microscopy, suggested that, instead of having the substage stop quite blacked out except for the annulus, cross or line, whichever the case may be, this should be replaced by an appropriate colour filter, and the portion which usually transmits the light be of another colour in contrast to it.

A number of combinations have been tried with the materials available to date and the best results were secured with the following:

| | Transmitting area, annulus, cross or line | Substage field filter, usually blacked out |
|---|---|---|
| 1 | Yellow | Blue |
| 2 | Yellow | Purple |
| 3 | Green (light) | Purple |
| 4 | Blue (light) | Red |
| | also used with success: | |
| 5 | Clear glass | Blue |
| 6 | Clear glass | Purple |

The Wratten series of filters have been used, and with those available the best results obtained have been in the order given above. It is essential that all filters shou'd have sharp absorption curves, so that too much chromatic overlapping is avoided. The image, that is the portion usually appearing black in ordinary monochromatic phase-contrast, assumes in each case the colour of the filter appearing in the second column, the phase 'halo' being that of the