OVER the past two decades, studies on chromosome morphology have been accomplished in several of the cereals. These studies not only have illuminated evolutionary processes but have been very helpful in breeding programs using cytogenetic techniques. This has been particularly true in the genus *Triticum*, where Sears (14) has used the cytological approach.

Kihara (6) was the first to report chromosome numbers of the genus *Avena* after which comparisons are made between the chromosome morphology of *A. byzantina* and *A. sativa* (12). Details on *A. byzantina* chromosomes are presented in this paper, in which comparisons are made between the chromosome morphology of *red oats* (*A. byzantina*) and the common oat, *A. sativa*. This karyomorphological investigation is a part of a mutation research program which has as one of its objectives the investigation of induced mutants which are resistant to *Helmintosporium victoriae* M. & M.

**MATERIALS AND METHODS**

The 'Victorgrain' variety of red oats, which has been used in the mutation research program to obtain strains resistant to *H. victoriae*, was used in the present study. 'Victorgrain' was developed from the cross between 'Victoria' and 'Fulgrain'. All three varieties are classified as *A. byzantinna* (15). The seeds were germinated in a petri dish at room temperature. Root tips were collected from roots 11/2 to 2 inches long at 9:00 a.m. Pretreatment of root tips was done with monobromonaphthalene (1 drop in 50 cc. of water) at 0°C. The root tips were fixed in Carnoy's solution 4 hours later and stored for 24 to 48 hours. For preparation of slides, root tips were hydrolyzed in 1N HCl for 10 minutes at 62°C and treated with Feulgen stain for 1 hour. After the root tips were washed in water for about 15 minutes, squash preparations were carried out, using aceticarmine. Cells having the complete and well-spread set of chromosomes were analyzed. The 15 chromosomes were measured with a millimeter scale to the nearest 0.1 millimeter from a photomicrograph of the cell and converted into microns. A fine pair of dividers was used to take the curvatures of chromosomes into account.

**RESULTS**

A photomicrograph of a cell used in the study is given in Figure 1. The satellite length, arm lengths, arm ratios, total lengths and ratios of a chromosome length to the total complement are presented in Table I. Lengths reported are an average of two measurements. A range of 5 microns between the shortest and the longest chromosome was observed, and arm ratios varied from 0.42 to 0.90. A photographic karyogram showing pairs of chromosomes is presented in Figure 2. An ideogram of the chromosomes is presented in Figure 3. With the exception of the two satellite chromosomes, the number assigned to each chromosome is in relation to its shortest arm.

**DISCUSSION**

Two pairs of satellite chromosomes were observed as shown in the photographic karyotype (Figure 2). Oinuma (9), however, reported 6 pairs of satellite chromosomes and concluded that the hexaploid species have more or less a tripling of the standard set. Rajhathy and Morrison (12) disagreed with the findings of Oinuma and proposed the allopliod origin of hexaploid oats (*A. sativa*) with ACD genomes. The former reported only 2 pairs of satellite chromosomes in 1952 (12). In a later paper, Rajhathy (11) reported 3 pairs of satellite chromosomes in *A. sativa*.