nystatin very likely inflicts damage on dividing chromosomes due to some physico-chemical stress and not through the synthetic phase of DNA.

Kihlman[15], reviewing work on chemically induced chromosome aberrations, stated that the breaks were generally of chromatid type and nonrandomly distributed within and between chromosomes. He[15] suggested some probable mechanisms involved for the localized breaks induced by MH, EOC, CA, BUdR, etc. However, the analysis of our data of chromatid breaks induced by nystatin and other antibiotics and mutagens lead us to conclude that the breaks are mostly due to some stress on inherently weaker regions in chromosomes[13,14].

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Telocentric chromosomes in pearl millet, Pennisetum typhoides

P. S. R. L. NARASINGA RAO, M. V. SUBBA RAO and I. NARAYANA RAO[1]

Department of Botany, Andhra University, Waltair–530 003, (India), 22 September 1975

Summary. In *Pennisetum typhoides* S. and H., a new karyotype was found with 13 normal chromosomes and 2 stable telocentric chromosomes, which represent 1 arm each of a submetacentric chromosome.

Pennisetum typhoides Stapf and Hubb., has a diploid number of $2n = 14$ chromosomes. In the normal complement, 5 pairs of chromosomes with near median to submedian centromeres and 2 pairs of chromosomes with subterminal centromeres are present[2]. In 4 out of 97 seedlings raised from a $3n \times 2n$ cross, a different karyotype with $2n = 15$ chromosomes was observed. Seeds from the $3n \times 2n$ cross were germinated in petri dishes on moist filter paper root-tips from germinating seedlings were pretreated in 0.003 M 8-hydroxy quinoline for 4 h at 14–16 °C, fixed in glacial acetic acid for 12 h and stained by Feulgen technique. The new karyotype differed from the normal one in the presence of 2 small chromosomes, in which primary constrictions were not detected. The 2 small chromosomes were unequal in size and roughly corresponded to the 2 arms of one of the submetacentric chromosomes (Figure 1), and thus were apparently telocentrics.

Acetocarmine squashes of PMCs from these plants also revealed 15 chromosomes. In all the 200 PMCs observed at diakinesis, the 15 chromosomes formed 6 bivalents and a trivalent. The trivalent was a heteromorphic chain of 3, with 2 small chromosomes associated one on each end of a longer middle chromosome (Figure 2). The 2 small chromosomes were not observed to pair with each other directly. In more than 60% of the PMCs at metaphase-I, the trivalent was oriented with the normal chromosome towards one pole and the 2 smaller chromosomes towards the other pole (Figure 3). This orientation would lead to disjunction of the normal chromosome from the 2 smaller chromosomes, and thus daughter nuclei with 2 small plus 6 normal chromosomes and 7 normal chromosomes would result. Such types of disjunction were observed at ana-

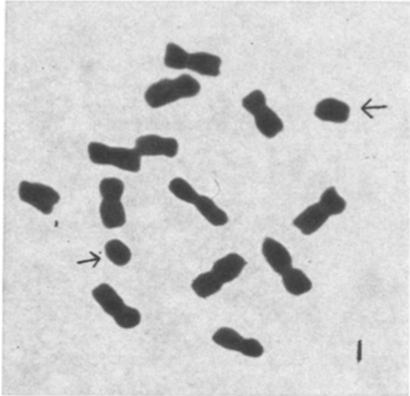

Fig. 1. Chromosome preparation from root tips showing 2 telocentrics (arrows) and 13 normal chromosomes.

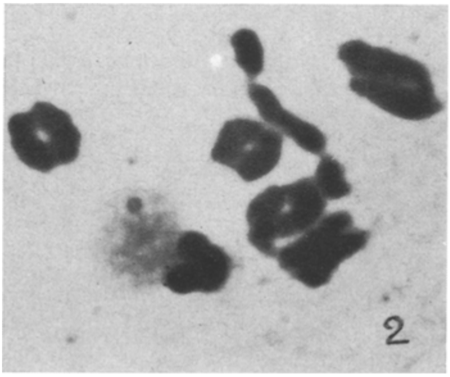

Fig. 2. PMC at diakinesis showing a trivalent (centre) with the telocentrics, one on each end of a longer middle chromosome.

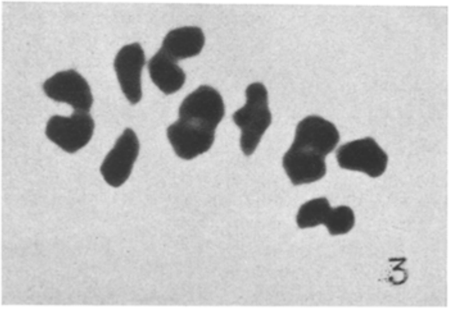

Fig. 3. PMC at the end of metaphase-I showing orientation and disjunction of the trivalent (extreme right), where the telocentrics separate from the normal chromosome.

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phase-I. Linear orientation of the trivalent was also seen in some cells. Disjunction in such cells would lead to anaphase-I nuclei with 1 small plus 6 normal chromosomes and 1 small plus 7 normal chromosomes; such types of disjunction were also observed at anaphase-I.

Chromosome orientation at metaphase-I and disjunction at anaphase-I, confirm that the smaller chromosomes are telocentrics (Figures 1–3). They are unequal in size, and in karyotype they roughly correspond to the 2 arms of one of the submetacentric chromosomes. Moreover, during meiosis they do not pair with one another, but regularly pair with the 2 arms of a normal chromosome. Thus they can be considered the long arm and short arm telocentrics of a submetacentric chromosome.

The telocentrics appear to be stable in that they are observed both in root-tips and PMCs of the same plant, and when plants with telocentrics were self- or cross-pollinated, telocentrics were also present in the progeny plants.

As already noted, different types of disjunction were observed at anaphase-I leading to nuclei with 1. 7 normal chromosomes, 2. 2 telocentrics plus 6 normal chromosomes, 3. 1 telocentric plus 6 normal chromosomes and 4. 1 telocentric plus 7 normal chromosomes. Such chromosome constitutions if present in functional gametes, on appropriate combinations can produce plants in the progeny with $2n=14$ to 16, containing 0–4 telocentrics and 12–14 normal chromosomes. One plant with $2n=15$ (2 telos plus 13 normal) was selfed and the progeny were scored for chromosome constitutions. Among 56 plants scored, the following classes were observed; 1. 9 plants with $2n=14$ (normal complement), 2. 40 plants with $2n=15$ (2 telos plus 13 normal) and 3. 7 plants with $2n=16$ (3 telos plus 13 normal).

Plants with a karyotype similar to the one described here and similar in meiotic behaviour, were also obtained from two other sources: 1. in one out of 35 plants raised from an asynaptic X diploid cross and 2. in one out of 100 plants raised from γ-ray irradiated seed. Attempts are being made to find out if the telocentrics from different sources are homologous.

It would seem that these telocentrics are derived from misdivision of the centromere of a submetacentric chromosome[3,4]. In univalents, either false univalents or those resulting from asynapsis or desynapsis, the centromeres might sometimes undergo a transverse break so that each arm of the univalent becomes a new and independent chromosome with a terminal centromere. Studies of Lima-de-Faria[5,6] revealed the duplex reverse repeat chromomere pattern of the centromere, which affords a mechanical basis for centromere misdivision[3].

Telocentrics reported here in pearl millet, behave as stable chromosomes. The view that telocentrics are unstable in nature[7–9], does not seem to apply to all telocentrics. Kush and Rick[10] reported that some telocentrics in tomato were stable. More recently, origin of stable telocentrics by centric fission was reported in Chinese hamster cells in vitro[4]. Marks[3] discussed the consequences of transverse and oblique breaks at certain positions in quadripartite centromeres and pointed out how telocentrics can arise in nature. According to him, chromosomes with completely terminal contromeres can be expected as a result of centric breakage; new partial centromeres, from a transverse break, are just as efficient as the original ones, thus resulting in stable telocentric chromosomes.

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The defensive function of cyanogenesis in natural populations[1]

W. M. Ellis, R. J. Keymer and D. A. Jones

Unit of Genetics, University of Hull, Hull HU6 7RX (England), 23 September 1976

Summary. Detailed ecological studies of some maritime populations of Lotus corniculatus L. have shown that the distribution of the cyanogenic form of this plant is directly related to the distribution and density of molluscs which graze selectively the acyanogenic form. This work, on a genetic polymorphism, is interpreted as giving direct evidence of chemical defence in natural populations.

Most of the current reports on chemical coevolution tacitly assume that secondary plant substances have a defensive function in plants[2,3]. There is remarkably little direct evidence for this, yet a few years ago one of us[4] was able to establish that cyanogenesis in Lotus corniculatus L. did have a defensive role: the cyanogenic form of this plant was less likely to be grazed by herbivores than the acyanogenic form. This was by no means the first example of chemical defence[5–7] but it was the basis from which the criteria for establishing a defensive role for these substances were clarified[8]. It was argued, that if a plant species is monomorphic for a putative defensive substance there are no means of knowing whether a particular herbivore would eat that plant if the substance were not present. The only way out of this impasse is to study species which are either polymorphic for putative defensive substances or contain them in varying concentrations. It has been easy to demonstrate in the laboratoy selective and differential eating by

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