Publications, Maruzan, Asia (PVL) Ltd. 1979, 282.
7. Finney, D. J., In: *Probit analysis*, 2nd edition (Cambridge University Press, London) 1964, p. 20.
8. Narasimha Murthy, B., Ph.D., thesis, S.V. University, Tirupati, India, 1983.
9. Reitman, S. and Frankel, A., *Am. J. Clin. Pathol.*, 1957, **28**, 138.
10. Lowry, O. H., Rosebrough, N. J., Farr, A. L. and Randall, R. J., *J. Biol. Chem.*, 1951, **193**, 265.
11. Kacew, S., Sinsal, R. L., Hrdina, P. D. and Ling, G. M., *J. Pharmac. Exp. Ther.*, 1972, **181**, 234.

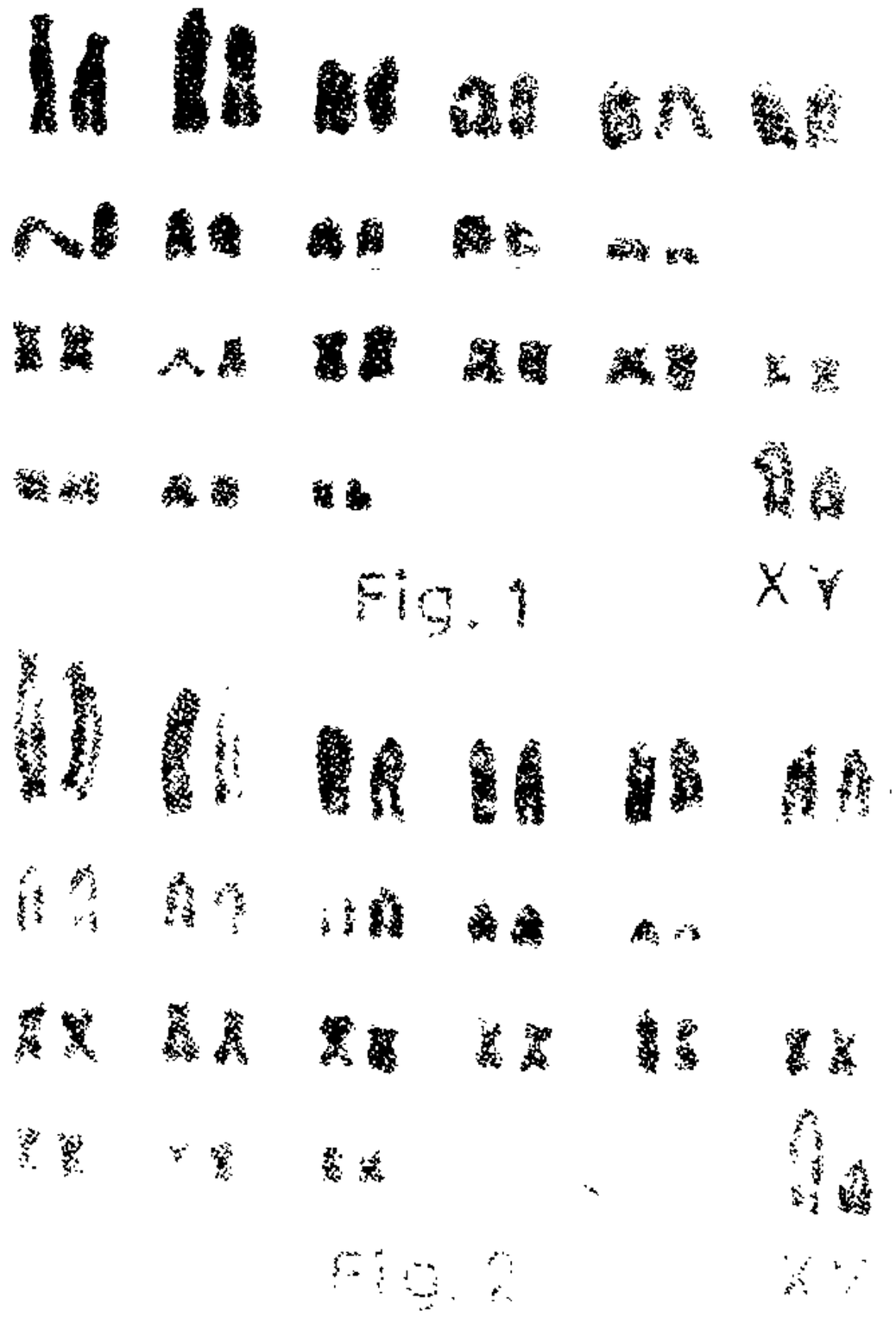
A CASE OF CHROMOSOME POLYMORPHISM IN *RATTUS RATTUS*

N. K. TRIPATHY, H. S. MISRA and C. C. DAS
Department of Zoology, Berhampur University, Berhampur 760 007, India.

THE common house rat *Rattus rattus* is unique for its chromosomal polymorphism which may be incidental to the geographic distribution of the species. Yosida *et al*[1,2] who described three geographic variants,the Asian ($2n = 42$), the Ceylonese ($2n = 40$) and the Oceanian ($2n = 38$) reported that the Asian type is the ancestral form from which the Ceylonese and the Oceanian types have evolved by way of chromosome fusion. The *Rattus* polymorphism was perhaps contributed by the supernumeraries[3–7].

Ten male and nine female rats were collected from the Gopalpur area. The bone marrow preparations were made following Colchicine-Giemsa-air-drying technique. The morphology of the chromosomes was determined following the procedure of Levan *et al*[8] on 10 well-spread plates from each individual.

The karyotypes of nine male and nine female individuals consisted of 42 chromosomes with 11 pairs of uniarmed (inclusive of X and Y) and 9 pairs of biarmed elements. The first pair of chromosomes (figure 1) is a submetacentric one with a small short arm and a relative length of 9.4%. The uniarmed chromosomes have a relative length range of 6.5% and 2.3% while the biarmed chromosomes ranged between 4.8% and 3.4%. In one of the male individuals, however, an extra uniarmed element was observed in its karyotype whereby the $2n = 43$ (figure 2). Interestingly enough the extra element resembled the smallest pair of acrocentric chromosomes in its size.



Figures 1, 2. 1. Karyotype of normal *R. rattus* male with $2n = 42$, **2.** Karyotype of male with $2n = 43$.

It has been shown that chromosome no. 1 of this species of rat is polymorphic with regard to the centromeric position[3,9]. It is believed that the karyotype where the first pair of chromosome is acrocentric is primitive and the karyotype where the first pair is submetacentric is a derived one consequent upon chromosomal reorganisation.

Most authors have shown supernumeraries in the black rats to be small metacentrics. However, we have found an extra acrocentric element which can compare with the last pair of acrocentrics of the normal karyotypes. A single case of subtelocentric supernumerary has so far been reported from Hokkaido (Japan), and its origin[7], it is claimed, is rather recent and independent of the metacentries.

The effect of extra elements, while being morphologically negative, can yet have visible influence on the physiology or behaviour of the host. White[10], however, felt that a single supernumerary confers an adaptive advantage on the individual while a higher

number of such elements can be harmful. The present results did not reveal any morphological and/or anatomical difference between the individual with the extra element and the one with a normal karyotype. Again, lack of data on the C-banding pattern, cannot unequivocally establish this extra chromosome as a supernumerary. This acrocentric extra chromosome must necessarily owe its origin through pericentric inversion or, independently from the cumulative effect of the naturally occurring radioactive elements in the area from where the specimens were collected.

18 October 1984; Revised 3 July 1985

1. Yosida, T. H., Tsuchiya, K. and Moriwaki, K., *Chromosoma*, 1971, **32**, 252.
2. Yosida, T. H., Kato, H., Tsuchiya, K., Sagai, T. and Moriwaki, K., *Chromosoma*, 1974, **45**, 99.
3. Gropp, A., Marshall, J., Platz, G., Olbrich, M., Manyanondha, K. and Santadust, A., *Z. Saugetierk*, 1970, **35**, 365.
4. Yong, H. S. and Dhaliwal, S. S., *Chromosoma*, 1972, **36**, 256.
5. Raman, R. and Sharma, T., *Chromosoma*, 1974, **45**, 111.
6. Yosida, T. H. and Sagai, T., *Chromosoma*, 1975, **50**, 283.
7. Yosida, T. H., *Cytogenet. Cell Genet.*, 1977, **18**, 149.
8. Levan, A., Fredga, K. and Sandburg, A. A., *Hereditas*, 1964, **52**, 202.
9. Yosida, T. H., *Proç Jpn, Acad.*, 1976, **52**, 130.
10. White, M. J. D., *Animal cytology and evolution*. 3rd Ed. The Univ. Press, Cambridge, 1973.

CLASTOGENIC EFFECT OF WR-2721 ON MOUSE CHROMOSOMES

P. UMA DEVI*, RACHNA GUPTA and BINTHI THOMAS
Department of Zoology, University of Rajasthan, Jaipur 302 004, India.
** Present address: Department of Radiotherapy and Oncology, Kasturba Medical College, Manipal 576 119, India.*

THE protective action of the drug WR-2721 is reported to increase with dose, giving a DRF (dose reduction factor) of 2.7 at 500 mg/kg body weight, the maximum tolerated dose in mice[1], which is very near its toxic LD_{50} of 550–780 mg/kg for different mouse strains[2]. This drug has been recommended for use in human protection for both military and clinical purposes at the maximum tolerated dose[3]. However, Phillips[4] listed a variety of toxic effects of WR-2721 in various species including man. Earlier studies from this laboratory[5] also showed weight loss and peripheral lymphopenia in mice receiving 400 mg/kg and 500 mg/kg WR-2721 i.p., while 200 mg/kg and 300 mg/kg did not produce such effects. Therefore, to determine a safe and effective dose which can be administered in clinical radioprotection without untoward side effects, the effect of this drug at different doses was studied on the mouse bone marrow chromosomes.

Six to eight week-old male Swiss albino mice were given single i p. injections of 200, 300, 350 or 400 mg/kg b.wt. of WR-2721 (phosphorylated, lot no. H-12, YM 08310), obtained from Yamanouchi Co., Tokyo, Japan, and dissolved in double-distilled water. The bone marrow chromosomes were studied at different post-injection periods from 1 day to 28 days, after arresting mitosis by a prior colchicine treatment and preparing metaphase plates by the modified air-drying method of Kilian[6]. Animals were sacrificed by cervical dislocation. The chromosome aberrations were scored under oil immersion and the different types of aberrations enumerated separately.

The results are presented in table 1. The lowest drug dose used (200 mg/kg) showed identical values of aberration frequency as in the normal untreated animals at all the autopsies. Hence the values are not given in the table. With increase in the drug dose, there was a corresponding rise in the number of aberrations which was most evident on day 7 post-injection. With 300 mg/kg, there was a slight increase in the percentage of aberrant cells which further increased in the 350 mg/kg and 400 mg/kg groups, where the number was significantly higher than the normal at this interval. In all the groups, the values came down after day 7, but in the higher dose groups the aberrant cell frequency was maintained higher than normal throughout the experiment (table 1). In the 400 mg/kg group a significant increase in aberrant cells was seen as early as day 1 after the drug injection; thereafter the number came down to normal, to rise again on day 7. This increase in all the groups was mainly due to stable aberrations of which chromatid breaks dominated. In the higher dose groups, unstable aberrations, represented mainly by fragments and polypolidy also contributed at the later intervals, *i.e.* from day 7 on.