Glycyrrhiza uralensis and *G. glabra* is in confirmity with the previous record[1,2], while it is reported for the first time for *G. macdonica*. $n = 8$ has been suggested as the basic number for different species of *Glycyrrhiza*[1-5].

The great majority of vascular plants possess karyotypes that are relatively symmetrical, that is, they have chromosomes of similar sizes within the same karyotype and chiefly median or submedian centromere[7]. The present study also shows that in *Glycyrrhiza glabra*, *G. macdonica* and *G. uralensis*, the karyotype is of symmetrical nature, since all these species have chromosomes with median and submedian centromeres.

Karyotype of the different species of a genus may either be much alike or vary greatly. Among seed plants in some genera, the karyotype in all the species of the genus remained constant from symmetry point of view *e.g.*, *Solanum*, *Hordeum*, *Bromus*, *Oenothera*, *Agave*, *Yucca* and *Furcraea* etc. In these plants since the inversions are paracentric and the translocations involve either relatively small or approximately equal chromosome segments, the basic features of the karyotypes remain constant or unaltered in all the species of the same genus[8]. The constant basic number ($2n = 16$) and relatively same size chromosomes with median or submedian centromere suggests that in the three species of *Glycyrrhiza glabra*, *G. macdonica* and *G. uralensis*, the basic features of karyotypes are unaltered, indicating relatively small number of chromosomes involved in the translocations during the course of evolution.

The symmetrical karyotype and the similarlity of the karyotype amongst the three species indicates that phylogenetically these species are primitive and are inter-related.

9 August 1984; Revised 26 September 1984

1. Techechow, W., *Planta*, 1930, **9**, 673.
2. Techechow, W., *Trud biol nautschn issledov Instt.*, 1935, p. 1.
3. Senn, H. A., *Bibil Genet.*, 1938, **12**, 175.
4. Covas and Cherubini, S., *Rev. Argent. Agron.*, 1946, p. 13.
5. Heiser, C. B. and Whitakar, T. W., *Amer. J. Bot.*, 1948, **35**, 179.
6. Levan, A., Frodga, K. and Sandberg, A. A., *Hereditas*, 1964, **52**, 201.
7. Stebbins, G. L., *Flowering plants-Evolution above the species level*, 1974.
8. Stebbins, G. L., *Chromosomal variation in higher plants*, (Arnold, London), 1971.

DISTRIBUTION OF ADRENALINE AND NORADRENALINE CHROMAFFIN CELLS IN THE ADRENAL GLAND OF A FRESHWATER TURTLE, *LISSEMYS PUNCTATA GRANOSA*

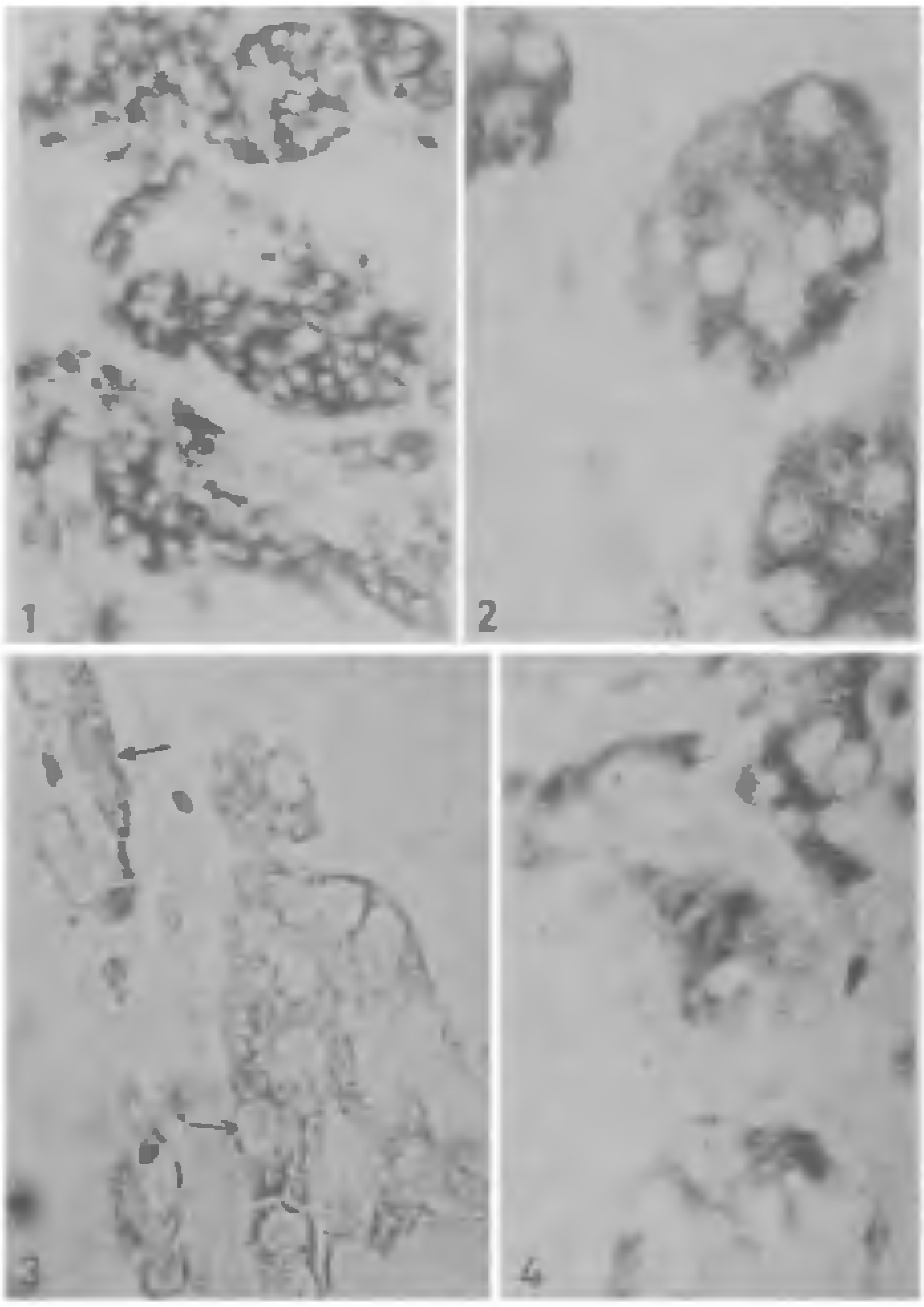
U. RAI and SHAMIM HAIDER

Department of Zoology, Banaras Hindu University, Varanasi 221 005, India.

ALTHOUGH the adrenal gland of reptiles have adrenaline (A) and noradrenaline (NA) chromaffin cells but there are numerous species belonging to this class which exhibit great variations in their arrangement and distribution. In most of the Squamates, the chromaffin cells lie mainly in a compact dorsal layer and send extensions into the parenchyma. A few islets of chromaffin cells also occur intermixed with the cortical strands. The dorsal layer and its digitations contain mainly NA cells, whereas the islets are constituted of only A cells[1-3]. In *Alligator mississippiensis* and *Caiman crocodilus*, belonging to order Crocodilia, a similar zonation of the two cell types has been observed as in Squamata[4]. However, in *Crocodylus niloticus*[5,6] all the clusters of chromaffin tissue contain A as well as NA cells. In the Chelonia, the clusters of chromaffin tissue may contain only one kind of cell or a mixture of both the types. As there is no separate dorsal concentration of chromaffin tissue in these animals, all the types of islets can be found in any zone of the gland[7,8]. This short communication reports on the distribution of two chromaffin cell types in the adrenal gland of *Lissemys punctata granosa* for the first time.

Specimens (15) used in this investigation were bought from local supplier and acclimated to the laboratory conditions for a week. Their adrenal glands were removed under anesthesia with ether and fixed in 3 different fixatives as required by 3 different techniques (Dichromate and iodate tests of Hillarp and Hökfelt[9]; and Glutaraldehyde silver technique of Tramezzani *et al*[10]) adopted for the identification of A and NA storing cells. The tissues were embedded in paraffin and 5 to 7 micra thick sections were obtained. The sections were deparaffinized in xylene and were observed in light microscope.

In the turtle, *L. p. granosa*, the clusters of chromaffin



Figures 1–4. 1 & 2. Showing the section of adrenal gland of *L. p. granosa.* Note the concentration of chromaffin clusters on the periphery of the gland in figure 1 and the scattered chromaffin clusters within the adrenocortical cords in figure 2. The presence of numerous dark NA cells intermingled with a few A cells can be seen. Glutaraldehyde silver technique. (× 290 × 800). **3.** Showing both kind of chromaffin cells. Note the dark A cells (Arrows) which are very few and the predominent NA cells (Light). Dichromate test (× 800). **4.** Part of the adrenal gland showing darkly stained NA cells. Iodate test. (× 800).

tissue are regularly interspersed among the adrenocortical cords and are more in number near the periphery of the gland than in the central region. The cytoplasm of most of the cells of chromaffin cluster stain dark brown with glutaraldehyde silver method (figures 1 and 2) and are iodate positive (figure 4). These cells are identified as NA cells. In the chromaffin clusters, 2 types of cells are distinguished on the basis of their staining intensity using dichromate test. The darker ones are A cells whereas the lighter ones are the NA cells (figure 3). However, the NA cells are more abundant than the A cells. The NA : A cell ratio is 12 : 1 (92% of the cells are NA).

The 2 types of chromaffin cells clearly differ in their localization in different orders of reptiles. The clusters of chromaffin tissue in the testudines may contain A cells, NA cells, or a mixture of the two types[7,8], and any of these three types of islets may be found at any point of the organ. In Crocodilia, all the clusters of chromaffin tissue contain A as well as NA cells[5,6]. Ghosh[11] reported that in birds the A and NA cells are usually mixed and arranged without any preferential location but he has found that there are strong variations in different species in the ratio of NA : A cells. On the basis of NA : A cell ratio, he has opined that this ratio relates to avian phylogeny. Thus, birds with a more primitive ancestry (*e.g.*, cormorant, chicken and egret) have more NA, while recently evolved birds (e.g., passerine birds) have more A. Recently, distribution of A and NA chromaffin cells in the adrenal gland of 10 members of the family Cordylidae have been studied by Laforgia and Varano[12]. According to them the adrenal gland of *Gerrhosauria* is most primitive because of the superficial distribution of most of the chromaffin cells and because of very high NA : A cell ratio. In the turtle, *L. p. granosa*, all the chromaffin clusters are mingled with adrenocortical cords and contain A as well as NA cell. However, more chromaffin clusters are located near the periphery of the gland, but do not exhibit dorsal concentration. Although, the NA : A cell ratio is very high in this species but we can not claim at this moment that *L. p. granosa* is a primitive species because this requires an elaborate comparative study on several species.

One of us (UR) is thankful to University Grants Commission under special assistance programme for the award of J.R.F.

13 August 1984

1. Gabe, M., In: *Biology of Reptilia*, Vol. III, (ed.) C. Gans and T. S. Parsons, Academic Press, New York, 1970, p. 263.
2. Lofts, B., In: *General, Comparative and Clinical endocrinology of the adrenal cortex*, Vol. II, (ed.) I. Chester Jones and I. W. Henderson, Academic Press, New York, 1978, p. 292.
3. Varano, L., In: *Biogenic Amines in Development*, (ed.) H. Parvez and S. Parvez, Biomedical Press, Elsevier/North Holland, 1980, p. 213.
4. Hebard, W. B. and Charipper, H. A., *Zoologica*, 1955, 40, 101.

5. Gabe, M., Martoja, M. and Saint Girons, H., *Ann. Biol.*, 1964, **3**, 303.
6. Gabe, M. and Rancurel, P., *Archs Anat. microsc.*, 1964, **53**, 225.
7. Gabe, M. and Martoja, M., *Archs Anat. microsc.*, 1962, **51**, 107.
8. Unsicker, K., *Cell Tiss. Res.*, 1976, **165**, 477.
9. Hillarp, N. A. and Hökfelt, B., *J. Histochem. Cytochem.*, 1955, **3**, 1.
10. Tramezzani, J. A., Chiocchio, S. and Wassermann, G. F., *Acta Physiol. latinoam.*, 1964, **14**, 122.
11. Ghosh, A., *Int. Rev. Cytol.*, 1977, **49**, 253.
12. Laforgia, V. and Varano, L., *J. Morphol.*, 1982, **171**, 79.

NEWS

TREATING WATER WITH OZONE

. . . "Unhappy with drinking water that sometimes tastes 'rotten,' [Clinton, Ill.] is joining a small but growing list of American communities that have turned down from chlorine to ozone for purification. . . . The city of 8,000 people spent $10,000 to study ozone water treatment and invited customers to taste the results. About 50 people tried the water and all 'commented on how clear it was and how good it tasted,' Tony Taubert [Clinton, Ill. Water Commissioner] said. So the city has decided to take bids on an ozone treatment system to kill bacteria and break down organic compounds. Twenty American communities already are using ozone, a highly active form of oxygen, to treat their water, said Rip G. Rice, a member of the Internatl. Ozone Assn. New ozone treatment systems are being installed in at least six others. . . . Ozone is more effective than chlorine in removing organic material that affects the quality of water. Taubert said, and it does not produce the cancer-causing compounds that have been linked to chlorination." [(In *New York Times* 2 Aug. 84, p. c11) (Reproduced with permission from: Press Digest, *Current Contents*®, No. 48, November 26, 1984, p. 16, Published by the Institute for Scientific Information®, Philadelphia, PA, USA.)]

CITATION ANALYSIS AND THE RANKING OF JOURNALS

. . . "While citation analysis shares many basic limitations with prestige analysis, it holds more promise as a useful technique for ranking journals. It has more intuitive appeal. It is also better suited to answer the kinds of questions which generally lead to efforts to rank journals—for example, the extent to which other professionals turn to specific periodicals in their own writing. The need to rank professional journals within scientific disciplines seems likely to grow. This will be particularly true as universities and private research agencies seek to improve their measures of individual productivity. But when journal rankings are used in this way, care must be taken to avoid the ecological fallacy of assuming that the quality of an article can be determined solely from the quality of the journal in which it was published. [Studies] suggest greater variation in the quality of articles published within than between journals. Furthermore, even the best measures of journal rankings are relatively crude. In most cases scholars would be well advised to rank journals in sets or clusters rather than by assigning artificially precise indicators of rank" [(Ralph A. Weisheit (Illinois State U.) & Robert M. Regoli (U. Colorado) in *Scholarly Publishing* 15(4): 313–25, Jul. 84. (Reproduced with permission from: Press Digest, *Current Contents*®, No. 49, December 3, 1984, p. 11, Published by the Institute for Scientific Information®, Philadelphia, PA, USA.)]