Much information is not available on comparative incorporation in pregnancy lipids in various biologcal organs/tissues involved in reproduction. This study covers relevant incorporation in ovary, adrenal, placenta and blood plasma in guinea pigs in mid-pregnancy. The blood plasma being the medium of transport has also been included in this investigation.

This paper constitutes a preliminary study dealing mainly on magnitude of incorporation in different organs/tissues under study.

Materials and Methods

Female guinea pigs in the range of 5-6 months age, and 600-800 g body weight were randomly selected. The experimental group (E) was allowed to breed to mid pregnancy and control group (C) was safely kept apart as non-pregnant. The animals were weighed and injected intraperitoneally with sterile solution of (1-C^{14}) acetate (specific activity 3.2 mc/mM) with a dose of 10uc/100 g body weight two hours before sacrifice by decapitation. The blood was collected in heparinised tube (200 units heparin in 1.0 ml. normal solution), sufficient for 50 ml blood. The abdomen was opened and ovaries, adrenals and placentae removed quickly and weighed correctly to 0.01 mg on a Meltar balance. Heparinized blood was centrifuged and blood plasma collected with Pasteur pipette and measured correctly to 0.1 ml.

The extraction, separation of lipids by TLC and estimation of specific activity was carried out as reported earlier (Sharma and Venkitasubramanian, 1973 a, 1973 b, 1973 c, 1974).

Results

Results of incorporation have been summarized in the Table.

Total lipids : Incorporation of total lipids in ovary, adrenal and blood plasma did not differ significantly in pregnancy and non-pregnancy states. However, apparently the ovarian incorporation was depressed by 20 per cent and adrenal incorporation enhanced by 85% in mid pregnancy. The blood plasma retained same level of incorporation in experimental and control groups.

The placenta showed a very high significance in incorporatiion as compared to other organs/tissues in pregnancy. Amongst non-pregnancy values, the blood plasma revealed significantly higher incorporation in contrast to other organs.

Lipid fractions: In ovarian lipid fractions, the incorporation was depressed in PE in pregnancy, with PC and sphingomyelin + lysophosphatidyl ethanolamine (SPH + LPE) fractions retaining the same level. The incorporation in ovarian esterified cholesterol was significantly elevated during pregnancy.

The incorporation in adrenal PC was significantly enhanced while other adrenal phospholipid fractions showed no activity. The blood plasma manifested a significantly depressed activity in PC and very high incorporation in PE during pregnancy. The blood plasma PE and few other phospholipids manifested no activity in non-pregnancy state (Table).

The placental lipids in general and placental phospholipids in particular showed a very high level of incorporation. The polyglyecerol phosphatide + phosphatidic acid (PGP + PA) revealed highest incorporation followed by PE, phosphatidyl inositol (PI) + PS, SPH + LPE and PC fractions in the order given (Table).

Discussion

The incorporation in pregnancy total lipids of various biological samples under study was higher in placenta. Blood plasma revealed 4.4 fold (not significant), and placenta 30 fold (significant) incorporation as compared to ovarian lipids in pregnancy.

Total lipids in ovarian tissue showed an apparent decrease in incorporation in pregnancy which was not significant. The concentration of total lipids in ovaries has, however, been reported to be elevated during pregnancy (Bloor **et al.**, 1930; Boyd and Eldon, 1935; Sharma and Venkitasubramanian, 1973 c), though the incorporation has apparently been diminished or at best remained constant at non-pregnancy level. This suggested lowered level of utilisation of lipids by ovarian tissue during pregnancy.

The striking change in ovarian phospholipids was a significant decrease in PE incorporation pointing to reduced metabolism of this fraction during pregnancy. There was little or no change in incorporation of PC in experimental group. The increased concentration of these fractions during pregnancy (Blood **et al.**, 1930; Boyd and Eldon, 1935; Sharma and Venkitasubramanian, 1973 c) despite their respective declined or constant level of incorporation suggested to their reduced utilisation by the ovarian tissue pregnancy. Similar evidence has been furnished by Morin (1968 a) for increased ovarian PC in pregnancy in rabbits.

Adrenal PC showed an increased incorporation in pregnancy state. The stepped up incorporation in PC suggested that this fraction was actively involved in adrenal phospholipid metabolism in pregnancy.

Blood plasma showed significant diminution in PC incorporation during pregnancy. The incorporation study revealed the presence of additional phospholipids which were found to be active in plasma during pregnancy (Table). Plasma PE showed the highest radioactivity of all phospholipids,

TABLE

Incorporation of (1-C^{14}) acetate in lipids of various organs/tissues in pregnacy (E), and non-pregnancy (C) states. The values given are mean + S.E. of six observations.

Lipids	Ovarian		Adrenal		Blood plasma		Placenta
	C	E	C	E	C	E	
Percentage incorporation of injected dose:							
I. Total lipids	.0049±.0006^{e}	.0039±.0006^{b}	.0027±.0006^{e}	.0050±.0014^{b}	.017±.0011^{d}	.017±.0022^{b}	.122±.03^{a}
Specific activity (cpm/mg):							
II. Phospholipids fractions :							
PI + PS	—	—	—	—	—	124.2±15.0^{b}	37275±565^{a}
LPC	—	—	—	—	—	—	28703±652^{a}
SPH + LPE	350.0±27.6^{e}	308.4±31.4^{b}	—	—	—	392.1±42.1^{b}	32313±352^{a}
PC	246.0±24.7^{e}	242.1±19.3^{b}	20.7±1.5^{f}	39.1±3.7^{b} *t	427.8±29.7^{d}	200.1±19.0^{b} *t	29259±550^{a}
PE	352.0±20.3	147.1±14.9^{b} *t	—	—	—	1138.8±15.2^{b}	56550±581^{a}
PGP+PA	—	460.2±27.1^{b}	—	—	338.0±42.1	381.0±15.2^{b}	72780±436^{a}
III. Neutral lipids:							
PC	506.2±40.0^{e}	507.5±19.7^{b}	—	—	807.0±83.0^{d}	—	9150±347^{a}
EC	1279.9±132.1^{d}	1728.2±68.7^{b} *t	139.8±7.2^{e}	307.2±75.7^{c}	387.1±37.5^{e}	203.0±11.5^{c}	8650±505^{a}

— stands for no radioactivity; *t stands for significance by t test between pregnancy and non-pregnancy values within the same organ/tissue; Corresponding lipid fractions between various organs/tissues are compared by Duncan's multiple range test in pregnancy (a,b,c) and in non-pregnancy (d,e,f). Means denoted by same letter are not significant, and those denoted by different letters are significant between themselves.

indicating its increased role in plasma lipid metabolism in experimental group. The role of different phospholipids as active fractions in adrenal and blood plasma during pregnancy was therefore quite obvious.

It is evident from high degree of incorporation in total lipids, phospholipids and cholesterol fractions of placenta that lipid metabolism in this organ is rather extremely active. Amongst phospholipid fractions, PE showed far greater activity than PC suggesting that PE was more actively involved in placental phospholipid metabolism in guinea pigs. The investigations revealed that the incorporation pattern of plasma phospholipids was similar to that of placenta specifying correspondingly higher activity in PE, and lowered activity in PC. This pointed to the possibility that blood plasma tend to supplement the availability of PE source to placenta.

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CHROMOSOME NUMBERS OF ANGIOSPERMS IN TANZANIA I

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Abstract

Chromosome Numbers of 30 taxa of angiosperms from Tanzania are reported. Of these, counts of 8 species are new. The occurence of B-chromosome in **Ornithogalum longibracteatum** is reported for the first time.

Introduction

Karyotpic studies and chromosome behaviour at meiosis are important to understand the genetic and breeding system of any taxon. The interest in such studies has increased considerably during the past two decades so that not only cytogenetists but, to a much larger extent, taxonomists also spend considerable time in determining the chromosome numbers of various taxa from different parts of the world. According to Solbring (1970) chromosome numbers of only 10 per cent of the species of phanerogams are known. Löve and Löve (1970) state that the chromosome counts for about 5,000 species are determined annually, representing studies from different parts of the world. But still the majority of the plants of the world including East Africa remain cytologically unknown. From the cytological point of view, very little information is available for the Tanzanian angiosperms. With this object in view the senior author has undertaken a project of chromosomal survey of the Tanzanian angiosperms. The project has been undertaken in two lines running concurrently

(i) an extensive approach aimed at determining the chromosome numbers of the maximum numbers of indigenous taxa, and

(ii) an intensive investigations devoted to a detailed biosystematic studies of some problematic taxa. The present paper is the first in this direction and lists the chromosome numbers of 30 species belonging to 14 families.

Material and Methods

The material studied was collected at random from the campus of the University of Dar es Salaam, but in some cases living material was collected in the field and transplanted into pots for further studies. Meiotic and mitotic preparations were made following Gill (1971a, b). Chromosome numbers were determined from 20-25 well spread pollen mother and root tip cells of each species and documented with camera lucida drawings. The results of chromosome counts along with vouchers, figure numbers and sources of the material are given in table 1. Vouchers are preserved in the Herberium of the University of Dar es Salaam, Tanzania. Families are arranged according to Dala Torre and Harms, 1907, with addition from Engler and Diels, Ed. 11, 1936. Against some species cytological notes have been added by an asterisks.

Discussion

LILIACEAE

Aloe : The chromosome counts of n = 7 in **A. volkensii** are first reports for this species. The present report is in agreement with the base chromosome number of 7 in this genus reported earlier by Darlington and Wylie (1955).

Anthericum : The haploid count of 16 in **A. suffruticosum** is a new record and is in line with x = 8 reported earlier by Darlington and Wylie (1955).

Eriospermum : Haploid chromosome number, n = 12 of **E. triphyllum** is reported here for the first time and conforms the base chromosome number x = 12 suggested by Jones and Smith (1967) for this genus.

Ornithogalum : Our counts of 2n = 10 + 2b* in **O. longibracteatum** differ from the previous report of 2n = 54 (Barrosneves 1959), but is in agreement with the base number of 5. The genus presents a dysploid series with x = 3, 5, 6, 7, 8 and 9. The occurrence of B-chromosomes in this genus has been reported earlier in other species, e.g. **O. umbellatum** 2n = 18 + 1b (Mesquita 1964) and **O. flavissimum** 2n = 12 + 5b (Pienaar 1963), but not reported earlier in **O. longibracteatum.**

LEGUMINOSAE

Crotalaria : The haploid chromosome number of 8 for **C. luburnoides** is a new report and is in agreement with x = 8. However, in **C.**

* The frequency of B chromosomes varies from 0 to 2.

retusa, earlier workers (Vide Federov 1969) have reported n = 8 but the number of 7 in our material was clearly counted for this species.

LIBIATAE

Hyptis : Morton (1962) suggested 7 and 8 as the base chromosome numbers for this genus and reported 2n = 32 for **H. suaveolens** from Legon, Ghana. Our own material of this species also shows the same number, n = 16. But Harvey (1966) from Sierra Leone and Miege (1960) from West Africa have reported a diploid number of 28. However, more counts covering populations from different areas are necessary before any definite conclusion can be made about the chromosomal diversity of this taxon.

PEDALIACEAE

Sesamum : The haploid number of 13 for **S. angustifolium** is a new count for this species and is in agreement with x = 13 reported earlier in this genus (Darlington and Wylie 1955).

COMPOSITAE

Ageratum : A survey of the literature (Vide Federov 1969) reveals that **A. conyzoides** contains diploid and tetraploid cytotypes. Our material with n = 20 is tetraploid. It would be interesting to study a large number of populations of this taxon and such investigations may reveal the presence of diploid cytotype in East Africa. However, Gadella (1972) also counted 2n = 40 from Cameroun (Manengouba Mts.).

Blumea : The gametic chromosome number of 11 is a new report for **B. aurita** and conforms to the base number of 11 suggested by Turner and Lewis (1965).

Launaea : The haploid number of 8 is the first report for **L. cornuta** and agrees with x = 8 reported earlier by Darlington and Wylie (1955).

Pluchea : The chromosome counts of n = 10 is in agreement with the base number of 5.

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TABLE I

Chromosome Numbers in Tanzanian Angiosperms

Taxon	Chromosome Number	Voucher	Source
LILIACEAE			
Albuca wakefieldii Bak.	n=9 (Fig. 1)	1 DSM. 1461	24 km. south of Tanga.
Alium cepa L.	n=8 Fig. 2)	LSG. 063	Cultivated, Dar es Salaam University campus.
*Aloe volkensii Engl.	n=7 (Fig. 3)	LSG. 051	Cultivated, Dar es Salaam University campus.
***Anthericum suffruticosum** (Bak.) Milne-Redh.	n = 16 (Fig. 4)	DSM. 1401	Steinbruch forest reserve, near Maweni west of Tanga.
***Eriospermum triphyllum** Bak.	n = 12 (Fig. 5)	2 AB. 1199	Ruaha National Park, Iringa District.
***Ornithogalum longibracteatum** Jacq.	2n=10+2b (Fig. 6)	3 BJH. 4581	Bandawa, Uluguru Mountain.

Taxon	Chromosome Number	Voucher	Source
Scilla indica Bak.	n = 15 (Fig. 7)	BJH. 5500	Ngorongoro.
Urginea indica Kunth	n=20 (Fig. 8)	BJH. 5976	Bagamoyo Road to Msata.
NYCTAGINACEAE			
Boerhavia diffusa L.	n=13 (Fig. 9)	LSG. 067	Dar es Salaam University campus.
LEGUMINOSAE			
Crotalaria laburnoides Klotzsch	n=8 (Fig. 10)	LSG. 054	Dar es Salaam University campus.
C. retusa L.	**n = 7** (Fig. 11)	LSG. 052	Ubungo, Dar es Salaam.
Gliricidia sepium (Jacq.) Walp	n = 10 (Fig. 12)	LSG. 055	Dar es Salaam University campus.
Rhynchosia sublobata (Schum. & Thonn.) Meikle	n=11 (Fig. 13)	LSG. 055	Dar es Salaam University campus.
EUPHORBIACEAE			
Ricinus communis L.	n = 10 (Fig. 14)	LSG. 061	Dar es Salaam University campus.
MALVACEAE			
Hibiscus micranthus L.f.	n=8 (Fig. 15)	LSG. 059	Dar es Salaam University campus.
APOCYNACEAE			
Vinca rosea L. (syn. **Catharanthus roseus** Don)	n=8 (Fig. 16)	LSG. 060	Dar es Salaam University campus.
CONVOLVULACEAE			
Ipomoea fistulosa Choisy	n=15 (Fig. 17)	LSG. 056	Dar es Salaam University campus.
LABIATAE			
Hyptis suaveolens Poit.	n = 16 (Fig. 18)	LSG. 002	Kilwa Road, 15km. south of Dar es Salaam.
SOLANACEAE			
Solanum incanum L.	n=12 (Fig. 19)	LSG. 047	Dar es Salaam University campus.

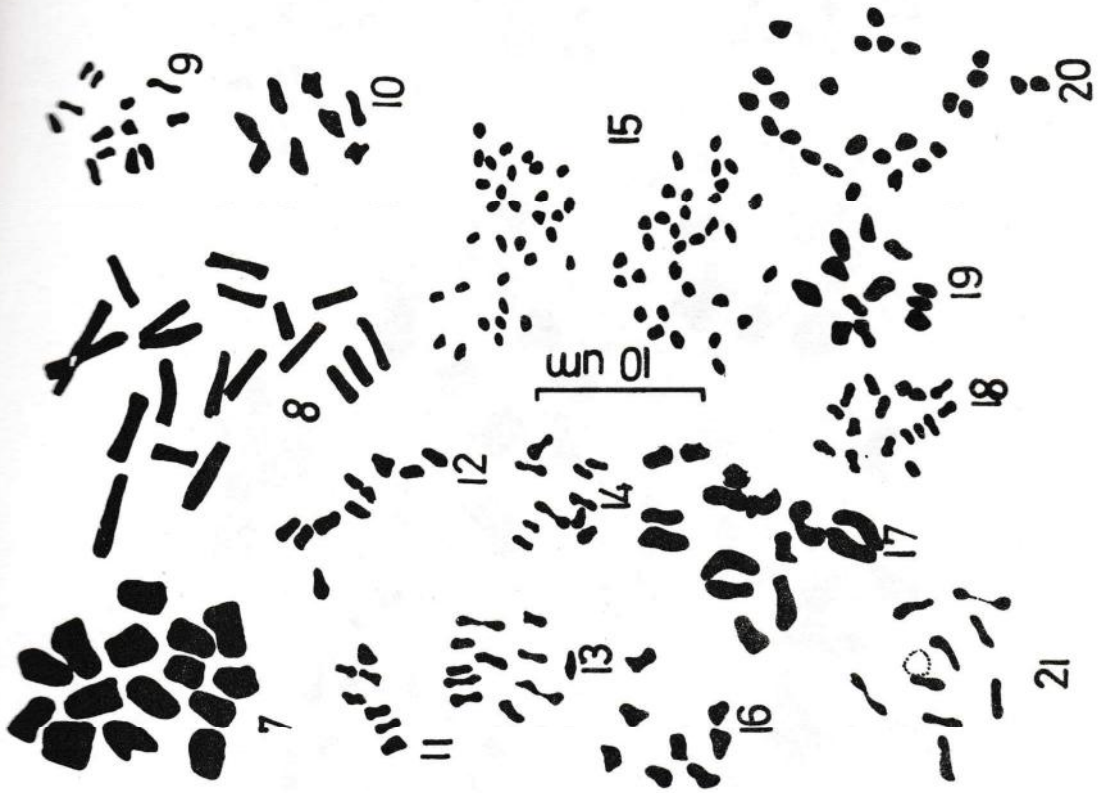
Taxon	Chromosome Number	Voucher	Source
PEDALIACEAE			
*Sesamum angustifolium (Oliv.) Engl.	n=13 (Fig. 20)	LSG. 058	Dar es Salaam University campus.
RUBIACEAE			
Agathisanthemum bojeri Klotzch	n=9 (Fig. 21)	LSG. 064	Dar es Salaam University campus.
CUCURBITACEAE			
Luffa cylindrica (L.) M.J. Roem.	n=13 (Fig. 22)	LSG. 069	Dar es Salaam University campus.
LOBELIACEAE			
Lobelia anceps L.f.	n = 7 (Fig. 23)	LSG. 062	Dar es Salaam University campus.
COMPOSITAE			
Ageratum conyzoides L.	n=20 (Fig. 24)	LSG. 065	Dar es Salaam University campus.
Blumea aurita (L.f.) DC.	n=11 (Fig. 25)	LSG. 057	Dar es Salaam University campus.
B. mollis (D. Don) Merr.	n=11 (Fig. 26)	LSG. 053	Dar es Salaam University campus.
*Launaea cornuta (Oliv. & Hiern) Jeffrey	n=8 (Fig. 27)	LSG. 048	Dar es Salaam University campus.
*Pluchea dioscoridis DC.	n=10 (Fig. 28)	LSG. 066	Dar es Salaam University campus.
Sonchus oleraceus L.	n=16 (Fig. 29)	LSG. 068	Dar es Salaam University campus.
Tridax procumbens L.	n=18 (Fig. 30)	LSG. 049	Dar es Salaam University campus.

1. Refers to the Material collected by students.
2. Refers to the material collected by A. Bjornstad.
3. Refers to the material collected by B. J. Harris.

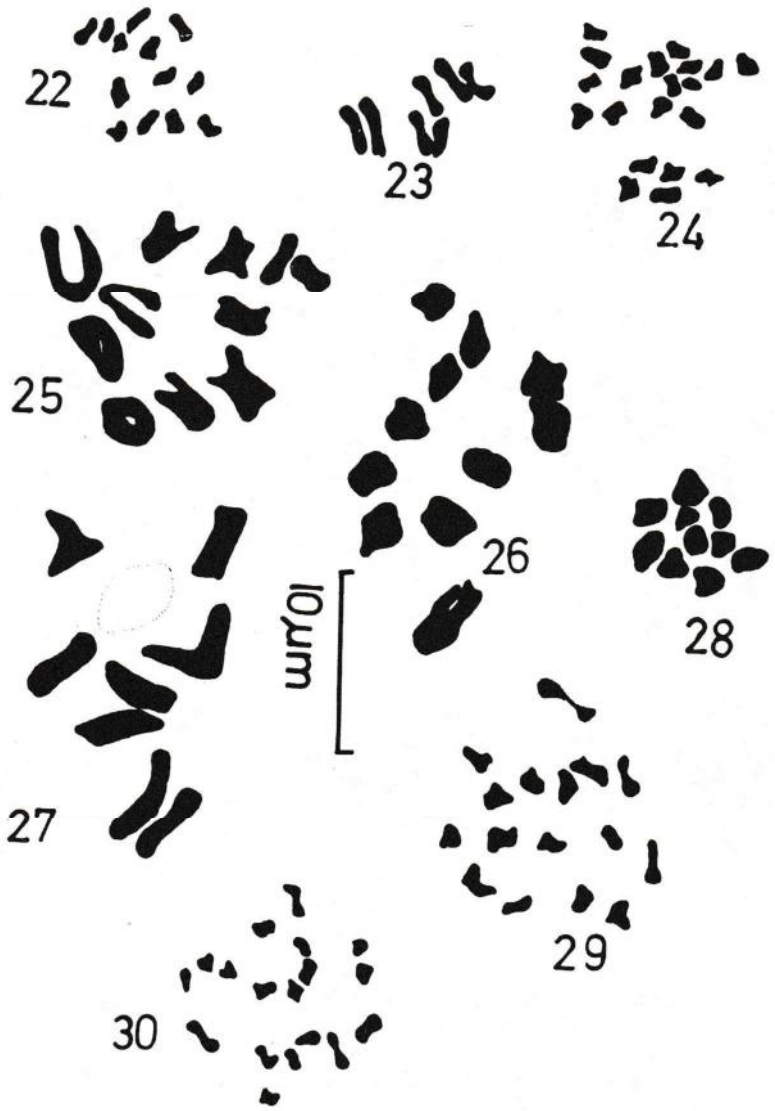
Figs. 1—30.

Camera lucida drawings.

1. *Albuca wakefieldii* n=9 diakinesis
2. *Allium cepa* n=8 first anaphase (one pole drawn)
3. *Aloe volkensii* n=7 diakinesis
4. *Anthericum suffruticosum* n=16 first metaphase
5. *Eriospermum triphyllum* n=12 first metaphase
6. *Ornithogalum longibracteatum* 2n=10+2b mitotic metaphase



7. *Scilla indica* n=15 First metaphase
8. *Urginea indica* 2n=20 mitotic metaphase
9. *Boerhavia diffusa* n=13 First metaphase
10. *Crotalaria laburnoides* n=8 First metaphase
11. *C.retusa* n=7 First metaphase
12. *Gliricidia sepium* n=10 First metaphase
13. *Rhynchosia sublobata* n=11 First metaphase
14. *Ricinus communis* n=10 First metaphase
15. *Hibiscus micranthus* n=32 First metaphase
16. *Vinca rosea* n=8 First metaphase
17. *Ipomoea fistulosa* n=15 First metaphase
18. *Hyptis suaveolens* n=16 First metaphase
19. *Solanum incanum* n=12 First metaphase
20. *Sesamum angustifolium* n=13 First anaphase
21. *Agathisanthemum bojeri* n=9 diakinesis



22. *Luffa cylindrica* n=13 First metaphase
23. *Lobelia anceps* n=7 First metaphase
24. *Ageratum conyzoides* n=20 First metaphase
25. *Blumea aurita* n=11 First metaphase
26. *B.mollis* n=11 First metaphase
27. *Launaea cornuta* n=8 diakinesis
28. *Pluchea dioscoridis* n=10 First metaphase
29. *Sonchus oleraceus* n=16 First metaphase
30. *Tridax procumbans* n=18 First metaphase