Thus Pandalai and George have not produced any proof to support their contention. They refer to the review of Pratt and Dufrenoy; these authors do not confirm the observations of Pandalai and George; they only comment on them. We primarily question the correctness of the results of Pandalai and George.

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## SEX INHERITANCE IN *LUFFA ACUTANGULA*

As a result of single plant selection studies, some true breeding cultures for various characters have been established from the local material of *Luffa acutangula* and two of such selections which differed in their sex condition formed the basis of the present genetical studies, *viz.*, *Jhingli No. 1* which is monœcious and *Satputia No. 1*, hermaphrodite.

Crossing was attempted both ways, but it succeeded with *Satputia No. 1* as female only. Sixteen $F_1$ hybrids were raised, all of which proved to be monœcious (producing male and female flowers on the same individuals). Very rarely hermaphrodite flowers were also observed on the same individuals. Pollen formation and seed setting were found to be quite normal in these hybrids.

$F_2$ generation was raised from selfed seeds of four different $F_1$ hybrids. In all 266 hybrids were raised and studied and they could be distinctly classified into three different classes (Table I), as explained below:

(*a*) *Monœcious plants*: This class of hybrids showed the sexes in different flowers, male and female, on the same individuals. They exhibited variation in two directions, *viz.*, (1) in the stage at which the female elements appeared, as in some of them the female flowers appeared soon after the male ones, whereas in others at a very late stage, and (2) in the appearance of hermaphrodite flowers in addition to male and female ones. In some of them such flowers appeared in greater number than in others.

(*b*) *Female plants*: This class of hybrids produced female flowers only.

(*c*) *Hermaphrodite plants*: This class of hybrids produced hermaphrodite flowers only.

TABLE I

*Segregation in $F_2$ population for different sex forms in a varietal cross of* L. acutangula

| | Segregation in $F_2$ generation | | | Total No. of $F_2$ hybrids |
|---|---|---|---|---|
| | Monœcious | Female | Hermaphrodite | |
| Observed | 203 | 51 | 12 | 266 |
| Expected on 12 : 3 : 1 | 199·5 | 49·875 | 16·625 | 266 |

$X^2 = 1{\cdot}372$ ; $p > 0{\cdot}50$

The $F_2$ segregation indicates that there are possibly two independent factor pairs, responsible for sex inheritance in this cross, designated as *AA BB*: The factor pair *AA* controls the expression of sex elements, both male and female, distributed in separate flowers on the same plant (monœcious condition). Where this factor for monoecious condition is lacking (in plants which are *aa*), the plant would be hermaphrodite, but this expression is influenced by the other factor *B* which controls the expression of female sex only and in its absence the plant again becomes hermaphrodite. But the factor *B* is ineffective in the presence of *A* which may be said to be epistatic to *B*. Sex in plants which are *aa* is then exclusively determined by *B*. Thus in the absence of *A* the hybrids with the constitution *aa BB* or *aa Bb* would be female plants and those with *Aa* or *AA* would be monœcious whether *B* is present or absent. In the absence of both *A* and *B*, the plant with the constitution *aa bb* will be hermaphrodite (the double recessive genotype). The constitution of the parents will thus be *aa bb* in the case of *Satputia No. 1* and *AA BB* in the case of *Jhingli No. 1*.

In short, sex inheritance in this cross is controlled by two independent factor pairs, one of which determines the expression of both sexes, whereas the other one controls female sex only, the first one being epistatic in action. In the absence of both, an individual becomes hermaphrodite.

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## PRODUCTION OF *P*-CYMENE FROM CARENE*

CARENE is a raw material for the production of *p*-Cymene (*i*).[1,2,3,4] The work reported in this note is on the disproportionation of this hydrocarbon to (*i*) over $Fe_2O_3$-gypsum catalyst.

The catalyst is prepared as follows: 17·5 gm. of $FeSO_4 . 7 H_2O$ is dissolved in 500 c.c. water; added to the solution a few c.c. con. nitric acid and gradually heated. To the fully oxidised solution added ammonium chloride and then dilute ammonia carefully with stirring, until the precipitate is permanent. The precipitate is washed by decantation several times with water. Mixed in 300 gm. of well-washed gypsum pieces, 8-10 mesh size. It is then dried on a water-bath with constant stirring, and finally ignited to the oxide stage in a fireclay crucible.

Carene (b.p. 163-68° C./745 mm. $d_{15}^{15}$: 0·8468, $n_D^{20}$: 1·4716) fractionally distilled from Indian turpentine (*P. longifolia*), is passed over the catalyst bed, 60 cm. long, occupying a total space of 234·0 c c.; time of contact is 3 hours for 100 c.c. carene.

The pyrogenic unit is described in a previous communication.[4]

Identification of (*i*) is by oxidation by chromic acid to terephthalic acid (dimethyl ester, m.p. 140° C.).

Table I gives the analysis of the major fraction containing (*i*) after one fractionation; Table II gives the result of the fractional

distillation of the pyrolysates. Young's 8-pear pyrex column is used in all cases.

TABLE I
*Analysis of the fraction boiling 173-78° C./745 mm.*

| | Temperature of pyrolysis ±15° C. | % Yield on the wt. of carene fed | Iodine value (Wijis method) | $d_{15}^{15}$ | $n_D^{20}$ |
|---|---|---|---|---|---|
| 1 | 300° C. | 28·0 | 84·0 | 0·8572 | 1·4820 |
| 2 | 350° C. | 23·6 | 77·0 | 0·8627 | 1·4875 |
| 3 | 400° C. | 20·5 | 79·7 | 0·8631 | 1·4860 |
| 4 | 500° C. | 14·9 | 71·3 | 0·8805 | 1·5013 |

TABLE II
*Analysis of the pyrolysates.*

| | B.P. C. 745 mm. | % yield on the wt. of carene | | | |
|---|---|---|---|---|---|
| | | Pyrolysis temperature ±15° C. | | | |
| | | 300° C. | 350° C. | 400° C. | 500° C. |
| 1 | Gases | 15·0 | 11·8 | 8·9 | 33·0 |
| 2 | -75° | 0·5 | 0·9 | 2·2 | 4·1 |
| 3 | 75–100° | 2·0 | 0·9 | 1·3 | 2·0 |
| 4 | 100–120° | 1·0 | 0·9 | 0·4 | 3·7 |
| 5 | 120–143° | 1·5 | 1·8 | 4·0 | 7·5 |
| 6 | 143–163° | 9·0 | 8·1 | 8·4 | 9·1 |
| 7 | 163–173° | 30·0 | 38·1 | 37·5 | 11·5 |
| 8 | 173–178° | 28·0 | 23·6 | 20·5 | 14·9 |
| 9 | Above 178° | 12·0 | 10·9 | 10·3 | 12·4 |
| 10 | Losses, etc. | 1·0 | 3·0 | 6·5 | 1·8 |

At 400° C. and 500° C. $Fe_2O_3$-gypsum is a more efficient catalyst than Pt-gypsum.[4] It yields purer crude (*i*) than that obtained with $V_2O_5$[4] or Pt-gypsum at 300°-500° C.

Thus the order of activity of the catalysts : partially-dehydrated gypsum,[4] $Fe_2O_3$-gypsum, Pt-gypsum and $V_2O_5$ : with respect to the purity of crude (*i*) produced is :

Partially-dehydrated gypsum > $Fe_2O_3$-gypsum > Pt-gypsum > $V_2O_5$.

Impregnation of gypsum with $Fe_2O_3$ or Pt does not increase its dehydrogenation power.

At 500° C., $Fe_2O_3$-gypsum catalyst exercises an aggressive effect on carene and yields over two and a half times the quantity of gaseous products than that obtained with partially-dehydrated gypsum.[4]

Lower fractions boiling from 120° C. to 173° C. give positive tests for (*i*) as evidenced by the formation of terephthalic acid when the samples are oxidised by chromic acid. Refractionation improved the yield of crude (*i*) by 30%.

This publication is delayed due to the political changes at Lahore.

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* The word 'carene' is purposely used. There is evidence that natural $\Delta^3$ - carene is not quite homogeneous.[5,6,7]

1. Kungl, Armeforvaltiningens Artilleri department (K.I.E. Skarblom and A. V. B. Linder) *Swed. Pat.*, 1938, **92**, 484. 2. Verghese, Bhushan, Gulati and Joshi, *J. Indian Chem. Soc.*, (Ind. and News Ed), 1944, **7**, No. 2, 93. 3. Guha, Roy and Paul, *J. Indian Inst. Sci.*, 1944, **26A**, 1. 4. Sondhi, Bhushan, Gulati and Joshi, *J. Indian Chem. Soc.*, (Ind. and News), 1947, **10**. Nos. 1 and 2, 17. 5. Goodway and West, *J. Chem. Soc.* 1938, 2028. 6. Guha and Roy, *J. Indian. Inst. Sci.*, **23A**, Part XIII, 204. 7. Rudakov and Artamanov, *J. Gen. Chem. Russ.*, 1945, **15**, 75.

## ON SOME PHYSIOLOGICAL PROPERTIES OF EXTRACTS OF WHEAT GRAINS

THE conditions generally necessary for successful seed germination are sufficient moisture as well as aeration and an appropriate temperature. According to Nelson[1] some kinds of seeds, *e.g.*, carrot and parsley, tolerate and indeed benefit from presoaking for 24 hours or even more, whereas a mass of soaking beet seeds can poison themselves in quite a short time unless the water is frequently changed. Evidently release of a poisonous substance from the seed is indicated. Duym, *et al.*[2] conclude, however, that the inhibiting effect of the extract from the seed balls of sugarbeet on the germination of Avena seeds is mainly due to the osmotic pressure of its salt content. Bonner, *et al.*[3] have found that the water extract of peas contains a leaf growth hormone. It now appears to be definitely established that seeds of maize, barley, rye and wheat contain free auxin (*cf.* Hatcher,[4] Avery, *et al.*,[5] Haagen-Smit, *et al.*[6]), which diffuses out into water medium.

The presence of salts or hormones in the water extract of seeds has interest from another point of view. It has been reported by Henkel, *et al.*[7] and also by Chinoy[8] from this laboratory that drought resistance is induced by alternately soaking wheat grains in water and drying prior to sowing. In view of the findings referred to above it is quite likely that some substances diffuse out from the seeds during soaking in water. With a view to investigating the causes underlying this effect of the water-soaking treatment we considered it worth while in the first instance to examine the properties of water extracts of wheat grains. Some of the observations made during the course of this study appear interesting and an account of the same is presented here.

Preliminary observations indicated that whereas the water extract of seeds of *T. Vavilovi* retarded the growth of the main root of germinating seeds of maize and wheat (sown in sand and moistened with extract), that from seeds of another variety, *viz.*, N. P. 165 had no such effect. A study of a number of varieties was, therefore, undertaken. As a test object the main roots of 15 germinating maize—var. Pusa yellow—seedlings (about 48 hours from sowing at room temperature when the main root was about 1·5 cm. long) were used. The seedlings were kept in petri-dishes with roots immersed in about 20 c.c. of distilled water or the extract and the lengths of the main roots