In the case of reddish it was observed[5] that the crossing-over in the classes which resulted from mutations of reddish to wild type, was increased in the reddish scute region from 0.7 to 13 per cent, and in the sepia-reddish region was decreased from 2 to 0.2 per cent. From the data given in table 4 a similar increase in the frequency of crossing-over in the magenta-

TABLE 4

THE DATA FROM THE CROSS *m f* × *mt m-α*, INDICATING THE RELATION BETWEEN THE CROSSING-OVER AND THE OCCURRENCE OF MUTATIONS

| $F_1$ PEDIGREE NUMBER | NO. OF $F_1$ ♀'S TESTED | $F_2$ ♀'S | 0 | 1–2 | | | MUTATIONS 0 | 1 | 2 |
|---|---|---|---|---|---|---|---|---|---|
| | | | *m f* | *m-α mt* | *mt m f* | *m* | *mt* | + | *mt f* |
| 5745 | 2 | 57 | 19 | 6 | 1 | 1 | 4 | 6 | . |
| 5795 | 1 | 74 | 22 | 3 | . | 1 | 21 | 2 | . |
| 5755 | 2 | 111 | 42 | 11 | . | 2 | 54 | 9 | . |
| 5853 | 7 | 271 | 84 | 38 | 1 | 7 | 79 | 12 | 2 |
| TOTAL | 12 | 513 | 167 | 58 | 2 | 11 | 158 | 29 | 2 |

forked region and decrease in the miniature-magenta region could be observed in the case of mutable magenta-α.

*Summary.*—The results of the experiments indicate that magenta-α reverts frequently to wild type. Mutations were observed at the formation of germ cells of heterozygous and homozygous females, in males and in the somatic cells of both females and males.

[1] Demerec, M., these PROCEEDINGS, **12**, 1926 (11–16).

[2] Demerec, M., *Ibid.*, **12**, 1926 (687–690).

[3] Metz, C. W., *Genetics*, **1**, 1916 (591–607).

[4] Metz, C. W., M. S. Moses, and E. D. Mason, *Washington, Carnegie Institution Publ.*, **328**, 1923.

[5] Demerec, M., *Washington, Carnegie Institution Year Book*, **24**, 1925 (30–31).

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## *POLLEN-TUBE GROWTH IN LYTHRUM SALICARIA*

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All investigators who have studied pollen-tube growth in self-sterile plants agree that the immediate cause of the failure to obtain seed after incompatible matings is due to the fact that growth is much slower than it is after compatible matings. The only quantitative investigation of the matter, however, is that of East and Park (1918) on hybrids between *Nicotiana Forgetiana* and *Nicotiana alata*. In this case it was found that pollen-tube growth after an incompatible mating was very nearly linear. The tubes traversed from one-half to two-thirds of the length of the style

in about seven days, at which time the flowers usually fell. Acceleration as growth progressed was slight. Growth curves of pollen tubes after compatible matings, on the other hand, showed remarkable acceleration, and fertilization ensued after about three days.

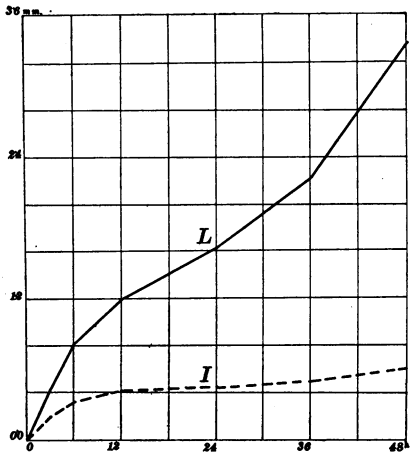


FIGURE 1

Pollen-tube growth in *Lythrum salicaria* after (*L*) legitimate and after (*I*) illegitimate pollination. Mid style × long style.

Since the genetic basis of this self- and cross-incompatibility in Nicotiana is a series of multiple allelomorphs (East and Mangelsdorf, 1925, 1926), and since this interpretation does not appear to fit the phenomenon as exhibited in *Lythrum salicaria*—upon which an extended series of investigations has been carried out in this laboratory—it seemed desirable to determine pollen-tube growth curves for "legitimate" and "illegitimate" unions in this species.

*Lythrum salicaria*, it will be recalled, is a trimorphic self-sterile species which shows complete fertility only in unions where a given style is pollinated with pollen from stamens of the same tier. Other unions, the "illegitimate" unions, are comparatively infertile, though there is considerable variation among the twelve types of "illegitimate" union.

The material, which consisted of a series of ovaries from a single mid-styled plant pollinated both "legitimately" and "illegitimately" with pollen from a single, long-styled plant, was given to me by Dr. E. M. East. It had been fixed partly in Flemming's medium solution and partly in Bouin's solution and imbedded in paraffin. The styles were fixed separately 3 hours, 6 hours, 12 hours, 24 hours, 36 hours, 48 hours, 60 hours, 72 hours and 85 hours after pollination. Several styles were available for each stated time.

From this material, longitudinal sections 12$\mu$ thick were made, and stained with saffranin, Heidenhain's hämatoxilin or saffranin-gentian violet-orange G. The best preparations were those fixed in Flemming's solution and stained with saffranin. The amount of material investigated is shown in table 1.

It was found that the pollen grains germinated as well after an "illegitimate" as after a "legitimate" pollination, but in the former case the growth was far slower. The average length, the major extremes and the variability of the pollen tubes at the various times after pollination are

shown in table 2. The average length of the pollen tubes plotted against time is shown in figure 1. There is a decided difference in the two curves. The curve for a legitimate union appears to be symmetrical with decided

TABLE 1

STYLES OF *Lythrum salicaria* INVESTIGATED

| LEGITIMATE UNIONS | | | | ILLEGITIMATE UNIONS | | | |
|---|---|---|---|---|---|---|---|
| TIME FIXED AFTER POLLINATION HOURS | NO. OF STYLES INVESTIGATED FLEMMING | BOUIN | TOTAL NO. POLLEN TUBES COUNTED | TIME FIXED AFTER POLLINATION HOURS | NO. OF STYLES INVESTIGATED FLEMMING | BOUIN | TOTAL NO. POLLEN TUBES COUNTED |
| 3 | 5 | 4 | 188 | 3 | 5 | 4 | 187 |
| 6 | 5 | 4 | 148 | 6 | 8 | 5 | 239 |
| 12 | 6 | 5 | 184 | 12 | 6 | 5 | 173 |
| 24 | 5 | 5 | 173 | 24 | 8 | 4 | 197 |
| 36 | 6 | 4 | 203 | 36 | 6 | 3 | 193 |
| 48 | 8 | 4 | 235 | 48 | 6 | 4 | 168 |
| 60 | 6 | 5 | | 60 | 8 | 5 | |
| 72 | 2 | 3 | | 72 | 2 | 3 | |
| 85 | 2 | 3 | | 85 | 2 | 3 | |

acceleration during later stages. The curve for an illegitimate union is unsymmetrical. Acceleration is shown in the later stages; but it is very slight.

TABLE 2

VARIABILITY OF POLLEN-TUBE GROWTH IN *Lythrum salicaria*

| TIME FIXED AFTER POLLINATION HOURS | MEAN LENGTH MM. | STANDARD DEVIATION | VARIATION AMPLITUDE | TUBE LENGTH IN PER CENT STYLE LENGTH |
|---|---|---|---|---|
| Leg. 3 | 0.45 | 0.35 | 0.1—1.5 | 10.0 |
| Leg. 6 | 0.81 | 0.45 | 0.1—1.9 | 17.3 |
| Leg. 12 | 1.19 | 0.60 | 0.1—3.2 | 22.7 |
| Leg. 24 | 1.62 | 0.70 | 0.1—3.3 | 39.8 |
| Leg. 36 | 2.19 | 0.95 | 0.1—3.9 | 42.8 |
| Leg. 48 | 3.38 | 2.20 | 0.1—7.2 | 54.5 |
| Leg. 60 | The styles begin to fall | | | |
| Illeg. 3 | 0.23 | 0.07 | 0.1—0.4 | 5.1 |
| Illeg. 6 | 0.34 | 0.15 | 0.1—0.7 | 7.0 |
| Illeg. 12 | 0.41 | 0.28 | 0.1—1.5 | 8.7 |
| Illeg. 24 | 0.46 | 0.35 | 0.1—2.8 | 8.5 |
| Illeg. 36 | 0.48 | 0.42 | 0.1—2.9 | 8.5 |
| Illeg. 48 | 0.59 | 0.70 | 0.1—3.3 | 10.8 |
| Illeg. 60 | The styles begin to fall | | | |

East, E. M., and Park, J. B., "Studies on Self-Sterility II, Pollen Tube Growth," *Genetics*, 3, 353–366, 1918.

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