A new allele at the *Tl* locus — tl^{na}

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A mutant line SGE-0812 with a *clavicula* (1, 2) (tendrilless) phenotype was isolated from the M_2 progeny of EMS-treated pea line SGE. In addition to the classical acacia-like leaf appearance, line SGE-0812 carries some other striking features. The whole plant of SGE-0812 is one-half to one-third the size of the SGE parental line. All parts and organs of plant are diminished proportionally. We denote this phenotype as *nana*. In addition, the SGE-0812 line has a strong *ramosus* tendency, forming lateral branches of different length at almost every node (figs. 1 and 2). It should be noted that the plants of the parental line SGE have only the main stem and very rarely form short lateral branches.

Fig. 1. SGE-0812 mutant line. This plant has two well developed lateral branches and many short lateral branches, while the parental SGE line usually forms only a single main stem.

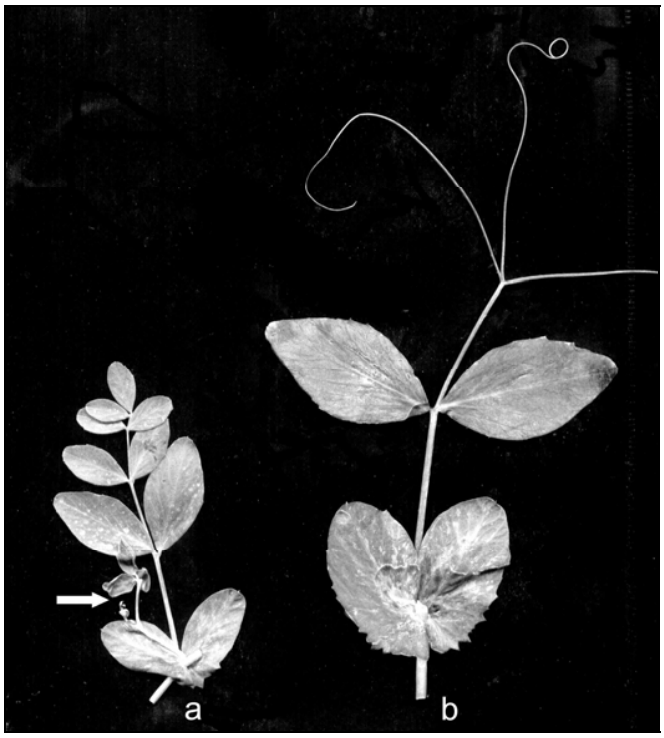

Fig. 2. Leaf of the SGE-0812 mutant (a) and the parental line SGE (b). Arrow indicates a lateral branch typical of the mutant line but rarely observed in the SGE parent.

Allelism test in the cross of SGE-0812 with the tester line WL1238 carrying the *clavicula* gene tl^{w} revealed that all F_1 progeny had an obvious *tl* (*clavicula*) phenotype. Thus, the SGE-0812 mutant evidently carries a new allele of the well-known *tl* gene. There remained the question whether the other phenotypic features of SGE-0812, such as size reduction (*nana*) and abundant branching (*ramosus*) result from an activity of the new *tl* allele or are independent mutation events. To clarify this uncertainty, I crossed the SGE-0812 line with the parental SGE line. In this cross all F_1 plants were of normal length, typical of the SGE line. The hybrid plants

also lacked any additional lateral branches but did show flattened tendrils, characteristic of *Tl/tl* heterozygotes. Only three phenotypic classes could be distinguished in the F_2 progeny of this cross, and their segregation ratio is given in Table 1.

Table 1. Phenotypic segregation in an F_2 progeny from the cross between lines SGE-0812 and its parent (SGE)

Phenotype	*Tl/Tl*, no *nana*, no *ramosus*	*Tl/tl*^{na} (flat tendrils), no *nana*, no *ramosus*	*tl*^{na}*/tl*^{na}, *nana*, *ramosus*
SGE-0812 X SGE	67	135	59
			χ^2 for 1:2:1 = 0.8008, 0.3 < P < 0.4

The results from the segregation of phenotypes in the F_2 indicate that both the *nana* and *ramosus* features co-segregate with the *clavicula* type. Thus, it is highly probable that the new allele of the *Tl* locus (designated *tl*^{na}) affects not only the leaf structure, but the constitution of the entire plant. *Tl* has usually been considered a homeotic gene, active primarily in the development of leaf structures (3, 4). My results indicate that *Tl* can affect a broader range of organogenic processes.

Acknowledgement: The author is grateful to Vera S. Bogdanova for her discussion of this work and support in preparing the publication.

1. Blixt, S. 1972. Agri Hort. Genet. 30: 1–293.
2. Pisum Genetics Association Gene List. Pgene. http://www.jic.ac.uk/GERMPLAS/pisum/Zgc4g.htm
3. Gourlay, C.W., Hofer, J.M. and Ellis, T.H.N. 2000. Plant Cell 12: 1279–1294.
4. Yaxley, J.L., Jablonsky, W. and Reid, J.B. 2001. Ann. Bot. 88: 225–234.