TESS Line : A Laboratory Line of the Musk Shrew (*Suncus murinus*, Insectivora), Triple-homozygous for the Curly Hair (*ch*), Cream Coat-color (*cr*) and Red-eyed Dilution (*rd*) Genes and Segregating the Sucrase Deficients (*suc/suc*)

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The TESS line, the first tester line of the *Suncus* has been developed. The TESS shrews are homozygous for three morphological mutant genes, *ch*, *cr* and *rd*. The gene (*suc*) for sucrase activity deficiency in intestinal brush-border membranes also exists in the line, and its frequency was 34.3%. The deficiencies could easily be identified by the drastic body-weight loss up to more than 15% of the initial weight, that aroused two days after replacement of the drinking water for its 10%-sucrose solution. The TESS shrews have been maintained as a closed-colony consisting of more than 30 individuals, and will be utilized in linkage analysis with the four loci (*ch*, *cr*, *rd* and *suc*).—KEY WORDS: linkage analysis, morphological mutant, sucrase deficiency, *Suncus murinus*

Several laboratory lines have been established from different wild populations of the musk shrew. Some hybrid lines derived from them have also been developed to keep the respective mutant genes (Fig. 1). However, it is still necessary to establish a particular line that can be useful for the linkage analysis in *Suncus murinus*, Insectivora. Four morphological mutant genes, curly hair (*ch*) [3], cream coat-color (*cr*) [1], red-eyed dilution (*rd*) [5] and kinky coat (*kc*) [2] were reported. No linkage relationships were suggested among the *ch*, *cr* and *rd* genes [5]. We tried to develop a new line homozygous for these three genes.

Reciprocal crosses between 6 shrews (+/+, +/+, *rd/rd*) of the OKI line and 6 shrews (*ch/ch*, *cr/cr*, +/+) of the MI line produced 46 F₁ shrews (*ch/+*, *cr/+*, *rd/+*). Crosses within the F₁ shrews produced 112 F₂ shrews [5]. Three males and 4 females in the F₂ shrews carrying at least four mutant genes at six positions of the three loci were selected.

These animals and a single MI female were the fundamental colony to develop the TESS (tester in *Suncus*) line. The triple-homozygous shrews (Fig. 2-A) obtained from the crosses within this colony were selected and mated between them. Now, the TESS line has been fixed with the three mutant genes and maintained as a closed-colony consisting of more than 30 shrews.

Existence of sucrase activity deficiency in intestinal brush-border membranes has been known among laboratory musk shrews (Fig. 1). This trait is controlled by an autosomal recessive gene (*suc*), and the activity in the heterozygous animals is about half of the normal level [4]. Therefore, the genotypes can be identified by examining the sucrase activity level in the tissue of intestine. Some shrews in the TESS line were sucrase deficient. The *suc* gene in the line must be originated from the MI line, because all shrews examined in the OKI line showed the normal level of sucrase activity but none of the MI line did (Fig. 1). The gene

development of the TESS line, the *suc* gene has probably no close linkage with the *ch*, *cr* and *rd* loci.

Fig. 3 indicates the amount of body-weight change in the TESS line shrews that aroused for two days after the drinking water was replaced for its 10%-sucrose solution. The sucrase activity deficient (*suc/suc*) could clearly be identified by the drastic body-weight loss in both sexes. The body weight loss of them reached more than 15% of the initial weight. This drastic change seemed to be caused primarily by dehydration, because the sucrose solution- and food-intake of the deficient were observed to be much decreased in later half of the test period. Immediately after the test, the deficient drank water actively, and they could quickly recover the body weight loss in a few days after the test. This method is very simple but valuable, because it enable us to select the deficient animals without sacrificing them for collecting tissue samples of their

intestine.

The TESS individuals must be useful to examine the linkage relationships between the four mutant genes (*ch*, *cr*, *rd* and *suc*) and other genes in the musk shrew.

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巻き毛 (*ch*), クリーム毛色 (*cr*), 赤色眼淡毛色 (*rd*) 遺伝子を ホモ型に持ち、スクラーゼ活性欠損個体 (*suc/suc*) を 分離するスunks (*Suncus murinus*, Insectivora) 実験室系統, TESS ライン

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スunksにおける最初のテスター系統 (TESS ライン) を育成した。TESS ラインの個体は, *ch*, *cr*, *rd* の3つの形態学的に識別できる突然変異遺伝子をホモ型に持っている。また, このライン内には, 小腸刷子膜スクラーゼ活性欠損遺伝子 (*suc*) も存在し, その遺伝子頻度は34.3%であった。欠損個体

は, 10%スクロース水溶液を飲水のかわりに2日間与えると, 体重が15%以上激減するため容易に判別できた。TESS ラインは, 毎世代30匹以上からなる閉鎖集団として維持されており, このラインの個体は4つの遺伝子座 (*ch*, *cr*, *rd*, *suc*) とのリンケージテストに利用できると考えられる。