

## Japan Customs Analysis Methods

No. 404

### Analysis Method for Leathers

(Issued in June 1999)

(Updated in November 2013)

#### 1. Scope

This analysis method is applied for identification of elephant hide, water buffalo hide, cowhide, sheepskin, goatskin, kidskin, horse hide, pigskin, crocodile skin, lizard skin, python skin and turtle skin, and their products.

#### 2. Outline of Test Method

This method identifies elephant hide, water buffalo hide, cowhide, sheepskin, goatskin, kidskin, horse hide, pigskin, crocodile skin, lizard skin, python skin and turtle skin mainly by observation of their surfaces (grain sides).

#### 3. Apparatuses

- (1) Loupes with  $\times 10$  to  $\times 20$  magnification powers
- (2) Stereomicroscope (or scanning electron microscope)

#### 4. Reagents

Organic solvents (chloroform, dimethylformamide, acetone and so on)

#### 5. Features of Surface (Grain Side) and Others (Refer to Photographs)

To identify the kinds of hides or skins, it is necessary to note the following features of elephant hide, water buffalo hide, cowhide, sheepskin, goatskin, kidskin, horse hide, pigskin, crocodile skin, lizard skin, python skin and turtle skin.

- (1) Elephant hide

On the surface (grain side), close protuberances with a diameter of approximately 1 mm to 3 mm are observed and pores (see the photo

“elephant hide (2)”) are found lying mainly along creases at intervals of a few millimeters to 1 cm.

- (2) Water buffalo hide

Pores, which are large and deep, are distributed uniformly along creases and they can be observed with the naked eye. Pore density of water buffalo hide is lower than that of cowhide.

- (3) Cowhide

Pores are small and hardly observed with the naked eyes. Pore density of cowhide is approximately 5 to 10 times higher than that of water buffalo hide. Pores are distributed uniformly and mostly arranged in regular rows.

- (4) Sheepskin

The size and disposition of pores resemble those of goatskin. In the cross section, it shows a lower density on the whole, and a more sparse structure compared to cowhide. The intersection of the fasciculi is poorly developed and fasciculi run in parallel with the grain side in most cases, which means a tenuous connection between the inner skin and the outer skin.

- (5) Goatskin and kidskin

Surface of the grain side is flat. Pores are small and each of the three pores seems to form a cluster. In the cross section, it shows lower density on the whole, and a more sparse structure compared to cowhide. Fasciculi run in parallel with the grain side and a few intersections of fasciculi are observed. Fasciculi particularly in kidskin are fine.

- (6) Horse hide

The size, disposition and pore density are

substantially the same as those of cowhide (kip and hide of adult cows). In the cross section, it shows an intersection of fasciculi. The fine structure resembles that of cowhide. Horse hide is generally thicker than cowhide (kip and hide of adult cows).

(7) Pigskin

The surface of the grain side is very rough and forms characteristic patterns. Pores are so large in size but small in number and they are easily recognized by the naked eye. In the cross section, it shows a sparse structure; relatively thick fasciculi and a few intersections of fasciculi.

(8) Crocodile skin

Patterns on the scaled surface are rectangular or hexagonal and the lengths of the sides are approximately 3 to 25 mm. In the cross section, fasciculi run in parallel with the scaled surface and the intersection of fasciculi is scarcely observed.

(9) Lizard skin

Rectangular or hexagonal patterns on the scaled surface of lizard skin are similar to crocodile skin, but the lengths of the sides are approximately 1 to 2 mm. Structure in the section is finer than that of crocodile skin.

(10) Python skin

Scales are nearly rhombus, the length of a side on the dorsal side is approximately 2 mm and that on the ventral side is approximately 7 to 10 mm. Products making use of its natural scale pattern present a black pattern on the dorsal side. In the section, it shows fineness between crocodile skin and lizard skin.

(11) Turtle skin

Patterns on the scaled surface are irregular: squares, triangles and so forth. In the cross section, obvious long fasciculi run in parallel with the scaled surface.

## 6. Points on Observation of Surface (Grain Side) and Others

(1) Observe patterns of pore disposition and the number of pores in a unit area.

- (i) The sample must be compared with standards (actual ones or enlarged photographs of

standards).

- (ii) Since tanning or surface treatment changes the condition of the surface, the state of the surface is not decisive in identifying the kinds of skin or hide.

(2) Observe the entire product carefully.

The pattern of pore disposition and its number in a unit area differs depending on regions. However, standards often represent only a region of the whole. Therefore, in some cases, observations of only a part of the sample may fail to see similarities in samples with the standard.

(3) Confirm whether the sample has been processed (dyeing, enameling, suede finish, embossing, etc.) or not.

It is important to discern whether the sample has been processed or not. Research on whether a supposed species for the sample can undergo an assumed processing chemically, physically or economically would provide effective information for identification.

(4) Observe creases.

- (i) In many cases, pores are present along creases. If pores are seen independent of creases, it is probable that the sample material has been processed for creasing.
- (ii) Observe hem in detail. For instance, if the material patterns with creases may show discontinuation of patterns particularly on folded edge, it is assumed that the sample has been processed for creasing.

(5) Check marks of wound, wart, skin diseases and so on.

These may sometimes provide an important factor for discernment.

(6) Remove the coating material if the surface is coated.

Removal of coating material facilitates observation. Acetone, chloroform and some other solvents are used for the removal.

(7) Observe cross section with a stereomicroscope (or a scanning electron microscope) if it is possible to cut the sample.

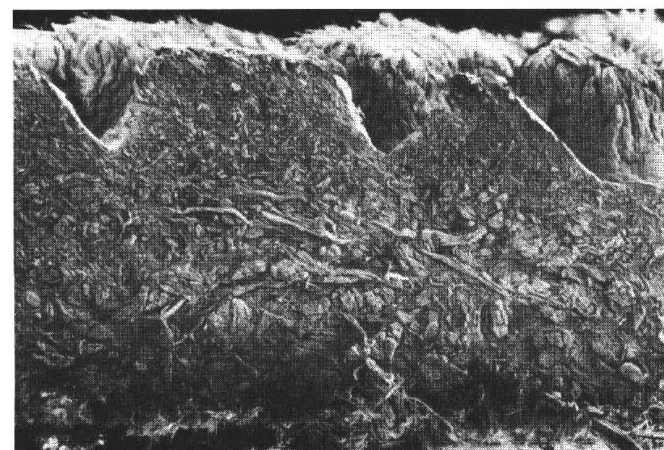
- (i) The density, thickness and disposition of fasciculi help to discern the kinds of skins and hides.

- (ii) In some cases, the sectional structure shows evidence to discern whether surface treatment (e.g. plastic sheet bonded together) has been executed.

## 7. Electron microscopic photographs, etc.



Elephant hide (1)  $\times 40$  [grain side]



Elephant hide  $\times 50$  [cross section]

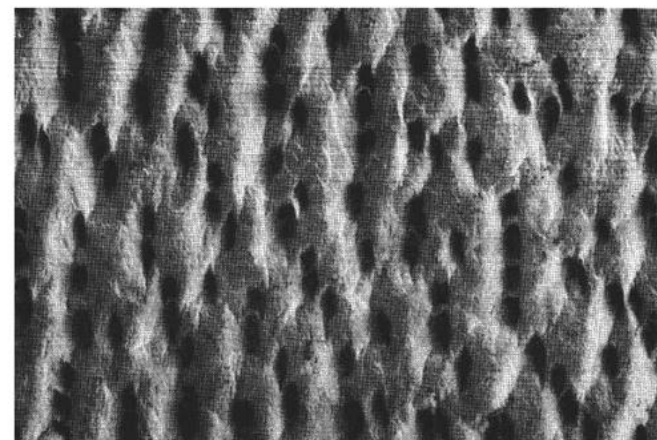


Elephant hide (2)  $\times 20$  [grain side]



0 0.4 mm

Water buffalo hide × 40 [grain side]



0 0.4 mm

Cow hide × 40 [grain side]



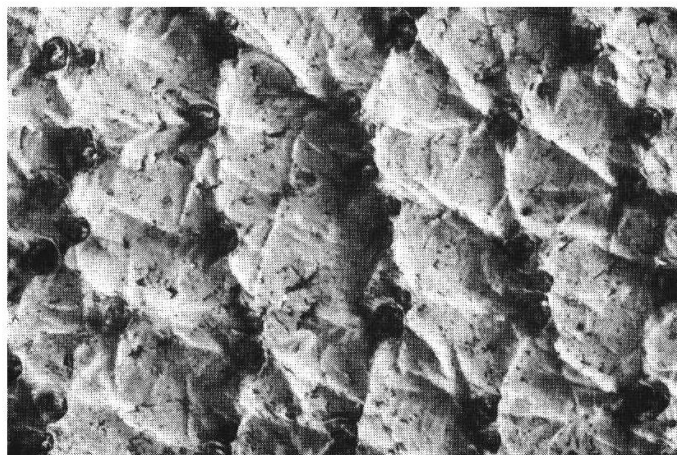
0 0.4 mm

Water buffalo hide × 50 [cross section]

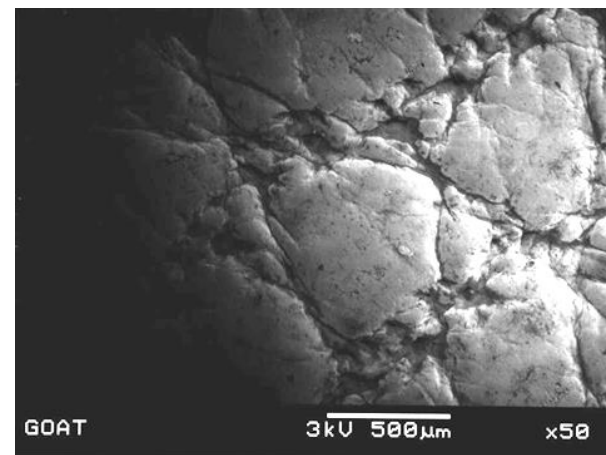


0 0.4 mm

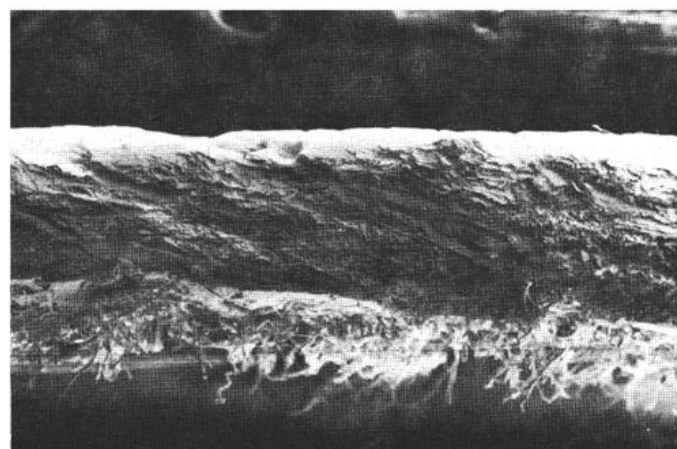
Cow hide × 50 [cross section]



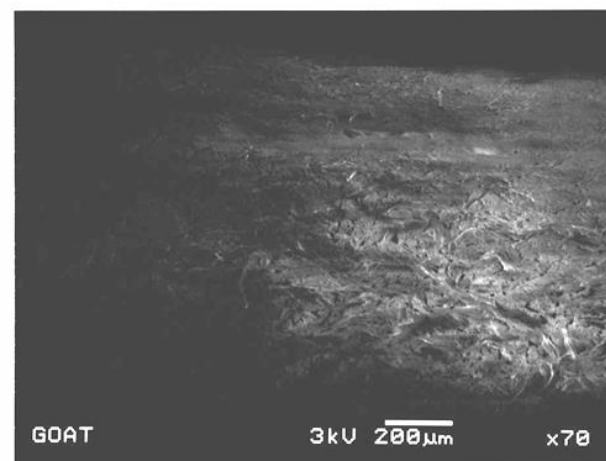
Sheepskin  $\times 40$  [grain side]



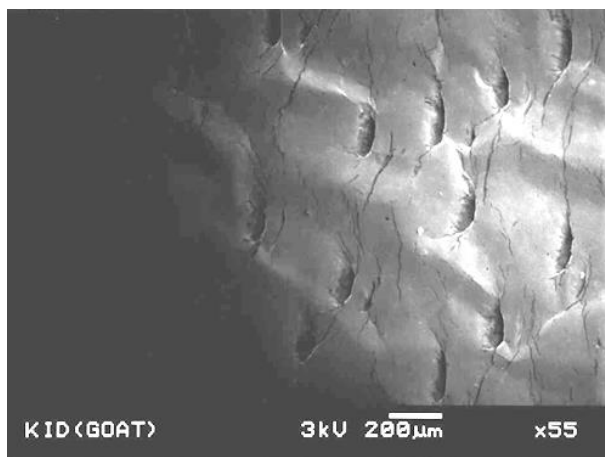
Goatskin  $\times 50$  [grain side]



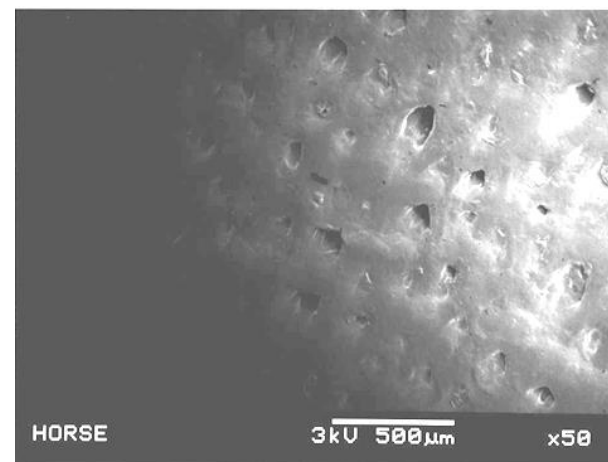
Sheepskin  $\times 50$  [cross section]



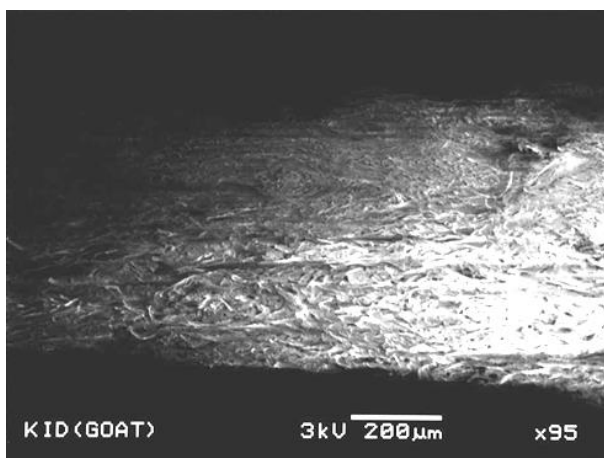
Goatskin  $\times 70$  [cross section]



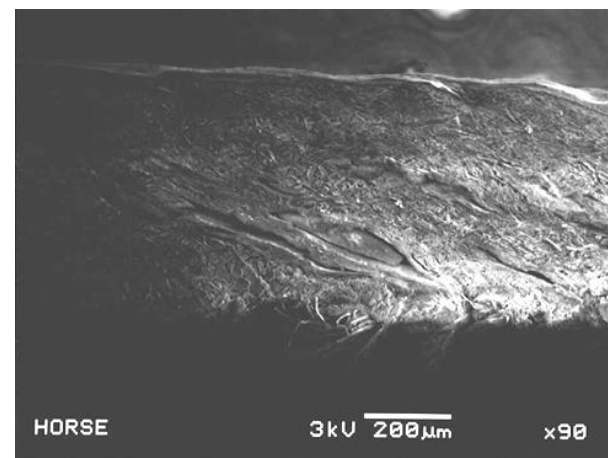
Kidskin × 55 [grain side]



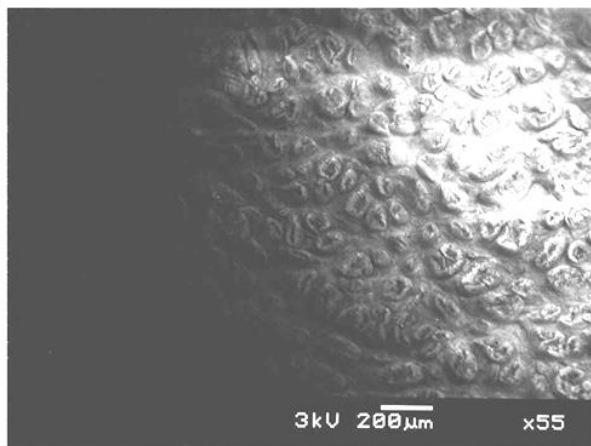
Horse hide × 50 [grain side]



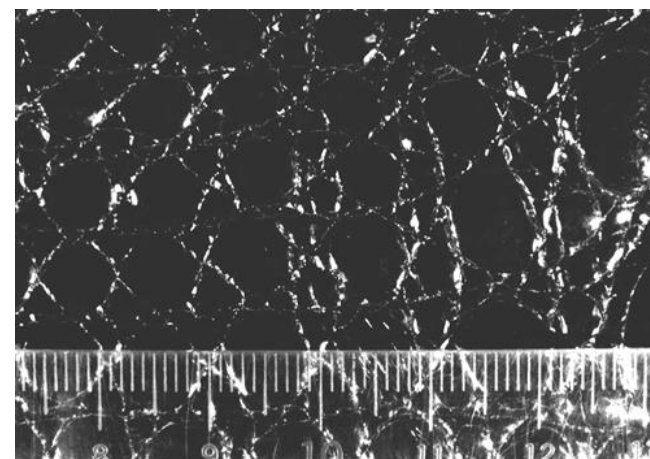
Kidskin × 95 [cross section]



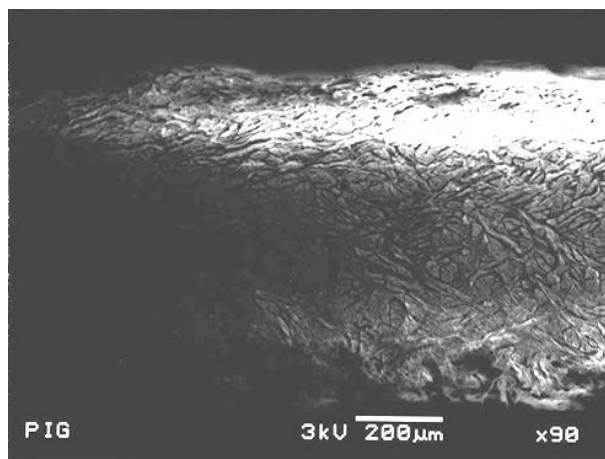
Horse hide × 90 [cross section]



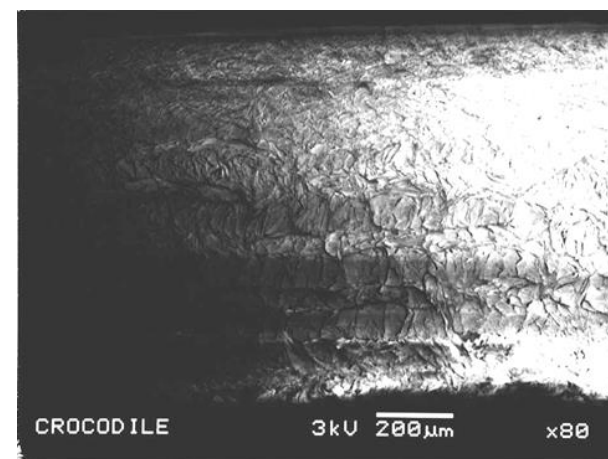
Pigskin × 55 [grain side]



Crocodile skin × 2 [grain side]

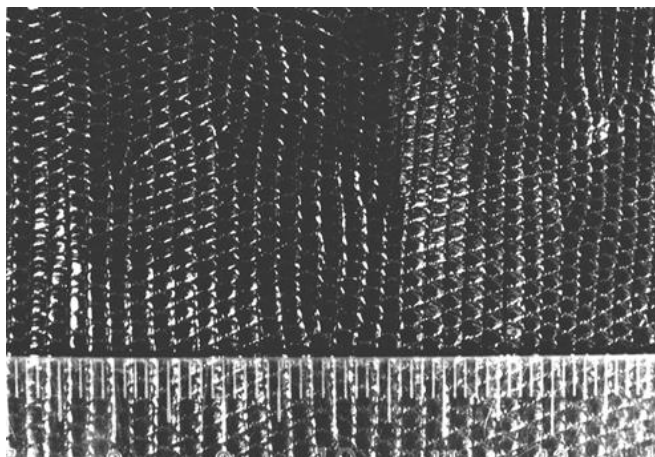


Pigskin × 90 [cross section]

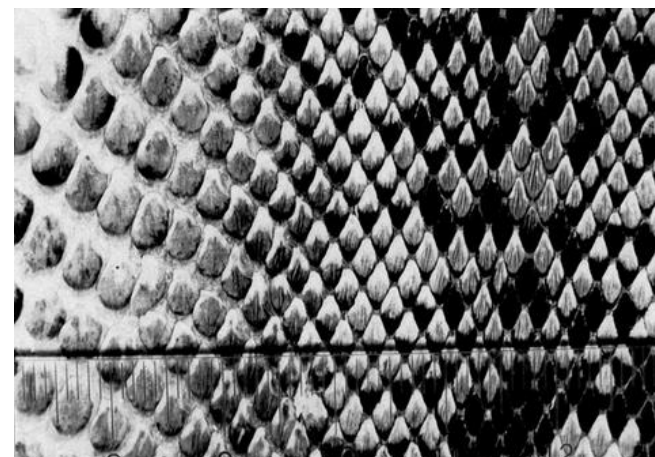


Crocodile skin × 80 [cross section]

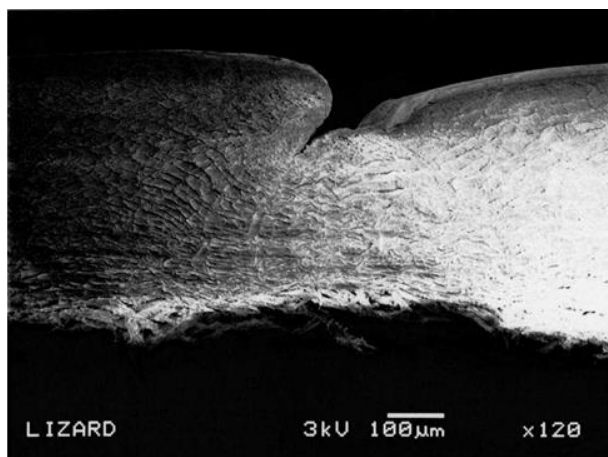




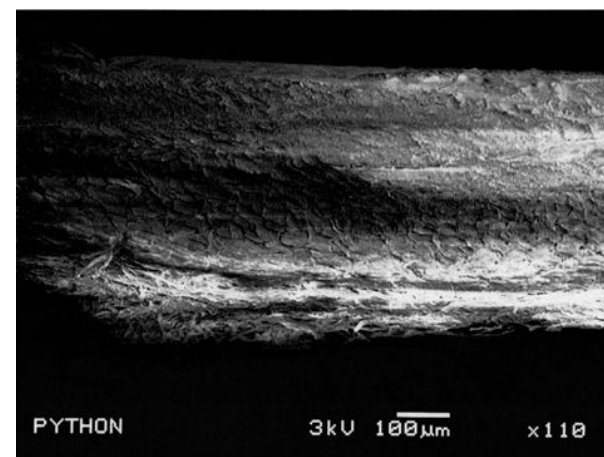
Lizard skin  $\times 2$  [grain side]



Python skin  $\times 2$  [grain side]



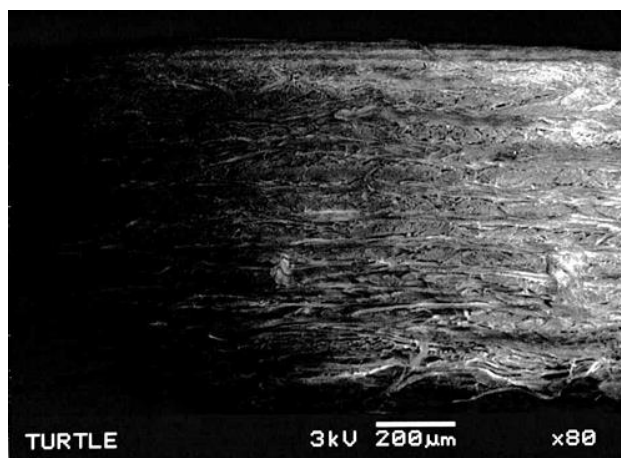
Lizard skin  $\times 120$  [cross section]



Python skin  $\times 110$  [cross section]



Turtle skin  $\times 2$  [grain side]



Turtle skin  $\times 2$  [cross section]

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## 8. Reference

- (1) Leather Science, ed. Japanese Association of Leather Technology (1992) (in Japanese).
- (2) Wada K., Kasosaka T. (1981) Reports of the Central Customs Laboratory **22**: 75 (in Japanese).