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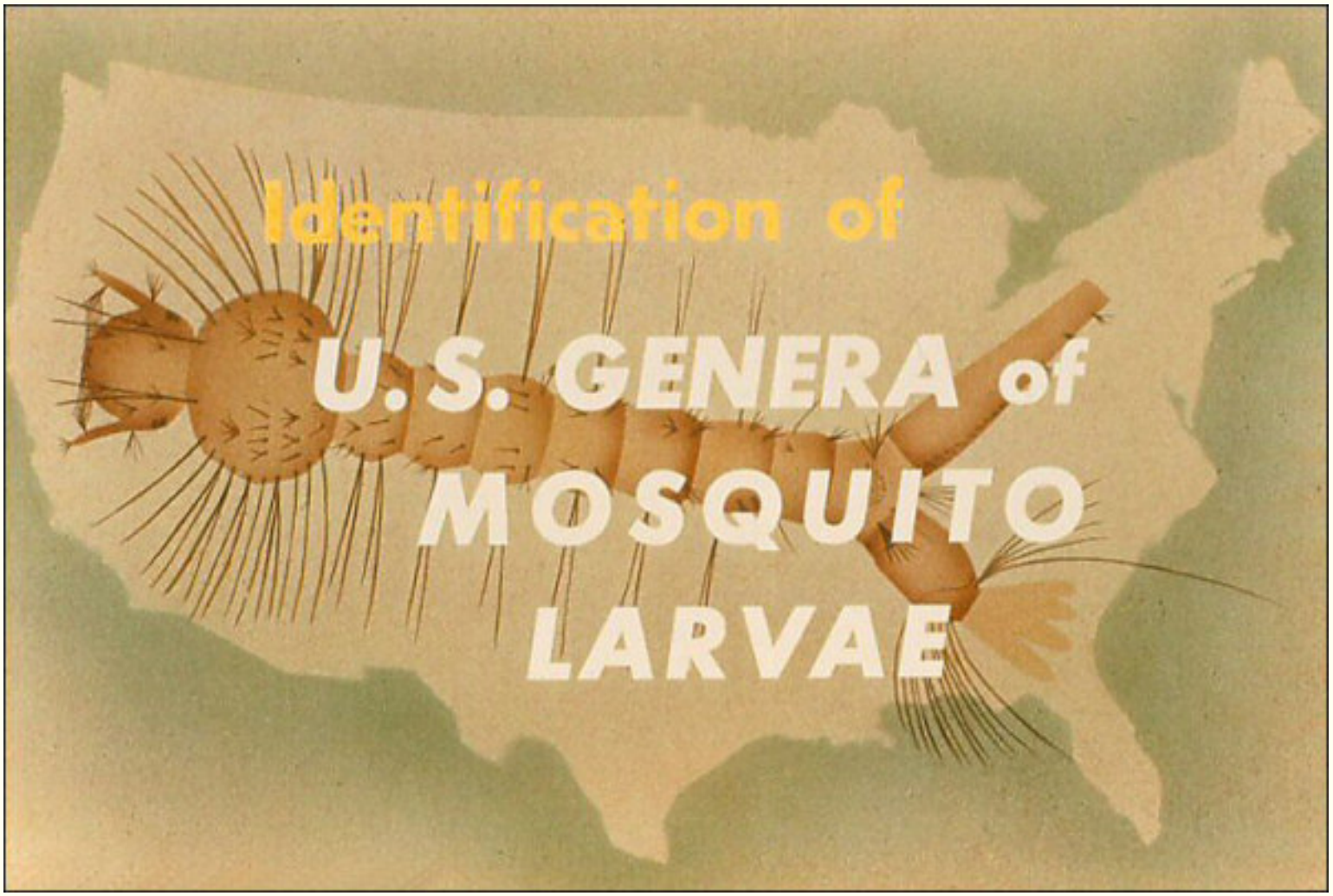
Team Mosquito

Slide 1



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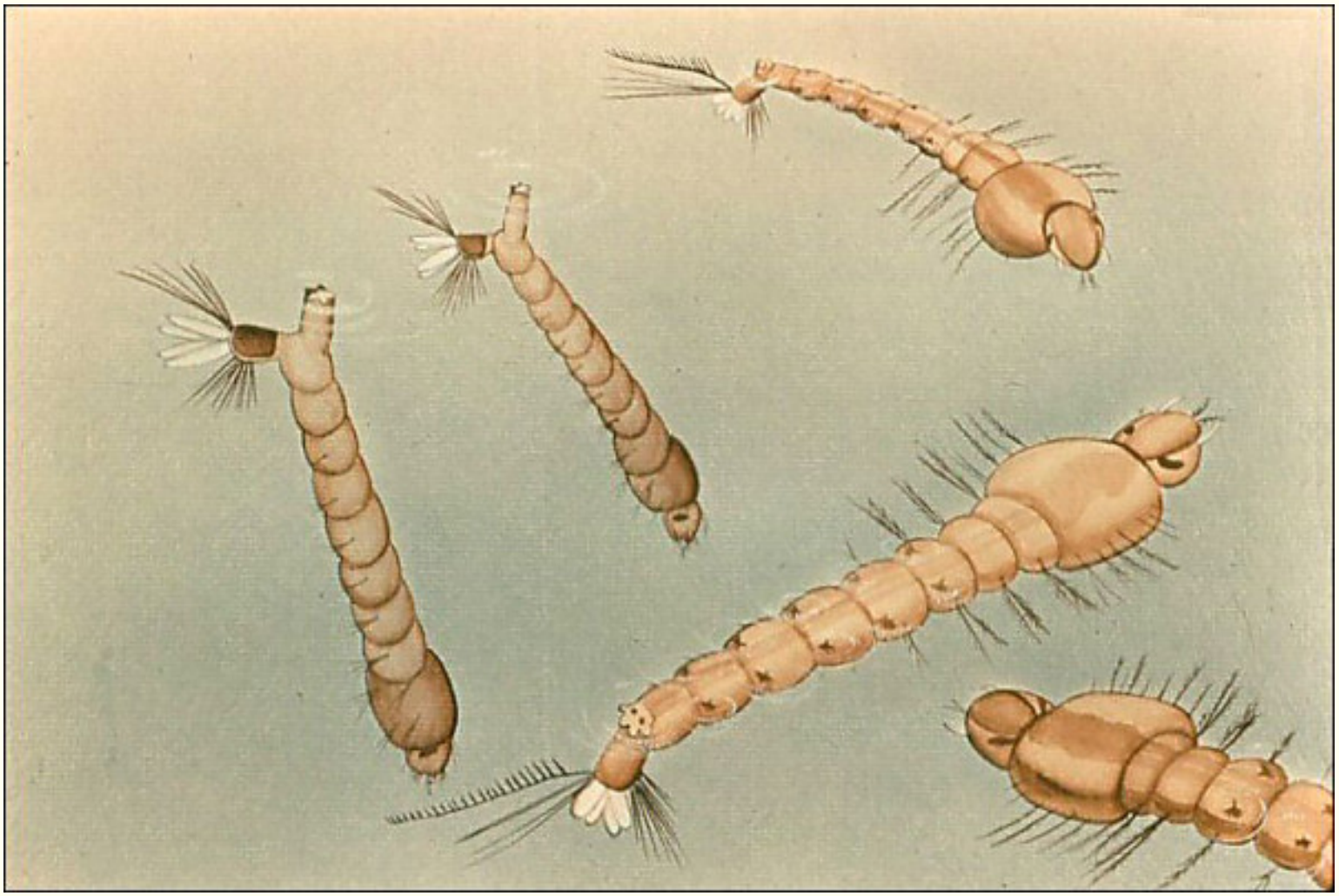
Slide 2



Recognition that the specimens are mosquito larvae is a prerequisite to identification of the genera.

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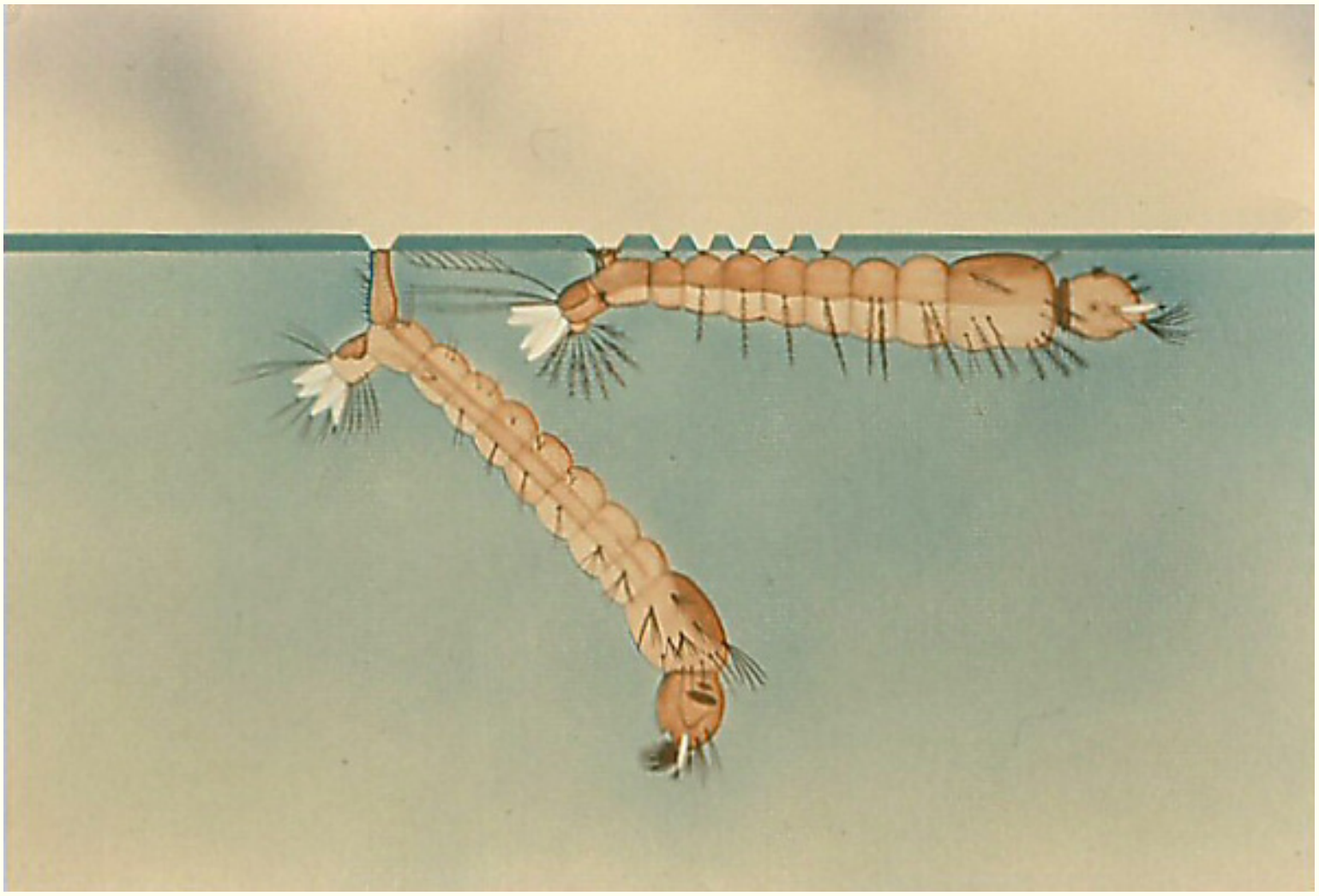
Slide 3



In the field, mosquito larvae may be observed resting at the water surface, either held horizontally against the surface by float hairs, or hanging at an angle to the surface by the siphon.

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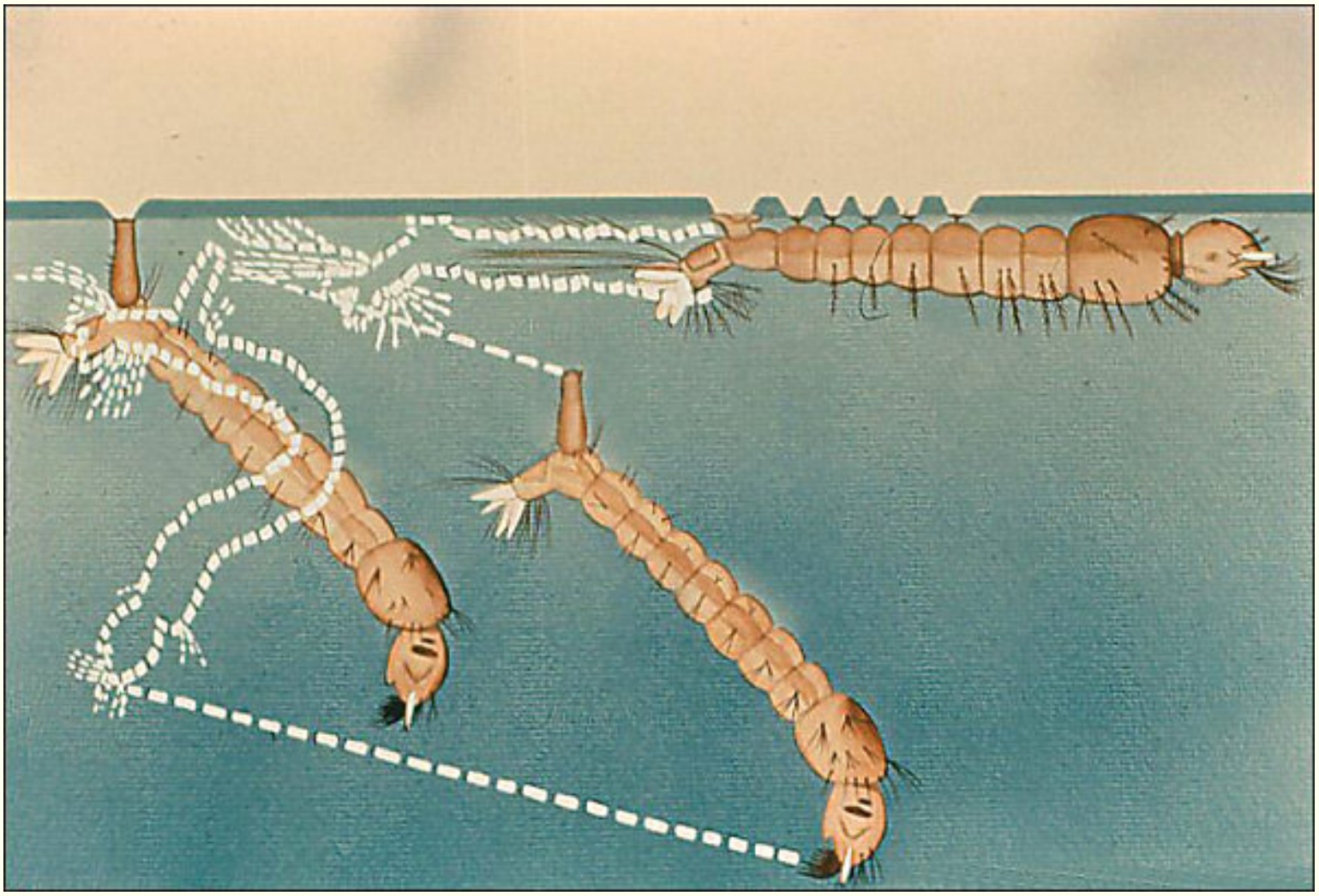
Slide 4



When disturbed, mosquito larvae either submerge or move over the water surface with a series of jerky movements.

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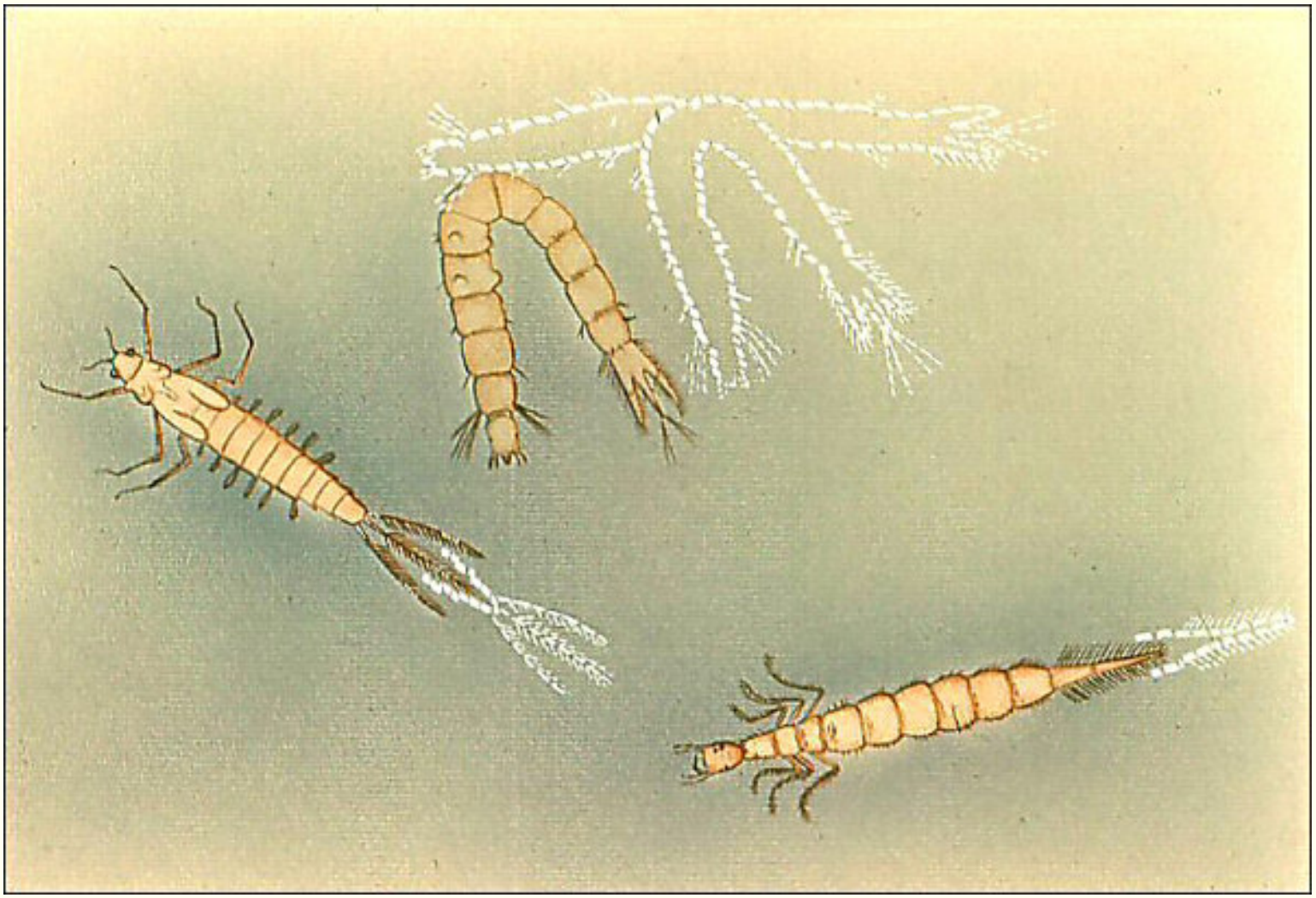
Slide 5



Mosquito larvae are not propelled by appendages as are the aquatic insects shown, nor do they move with rhythmic undulating motions characteristic of many aquatic insect larvae.

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With slight magnification, the main body divisions and gross morphological characteristics of mosquito larvae can be observed.

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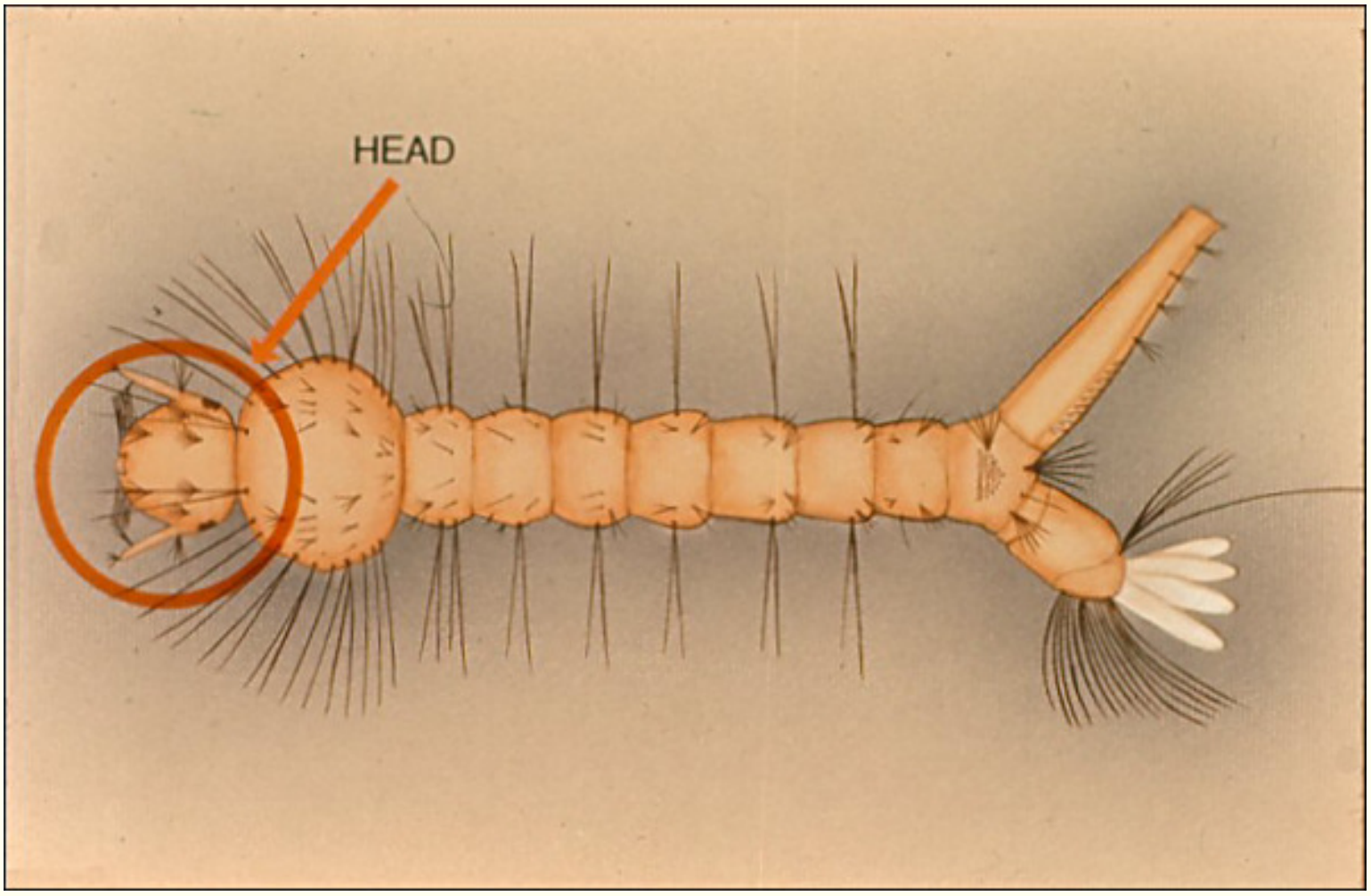

The head is round in appearance and flattened slightly dorso-ventrally.

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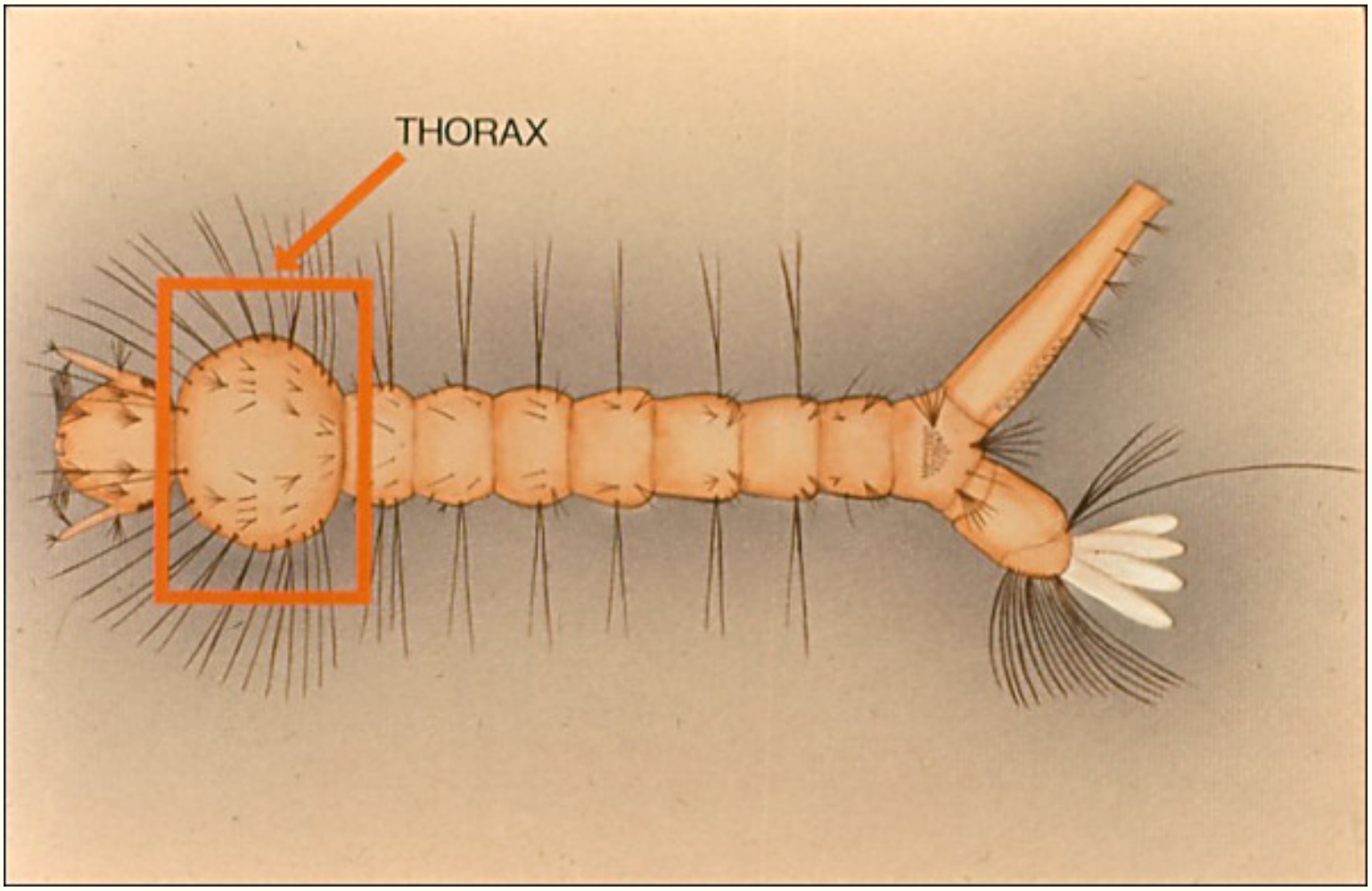

The head is attached to the thorax by a very narrow neck. The thorax appears unsegmented, but like the head it is actually composed of several fused segments.

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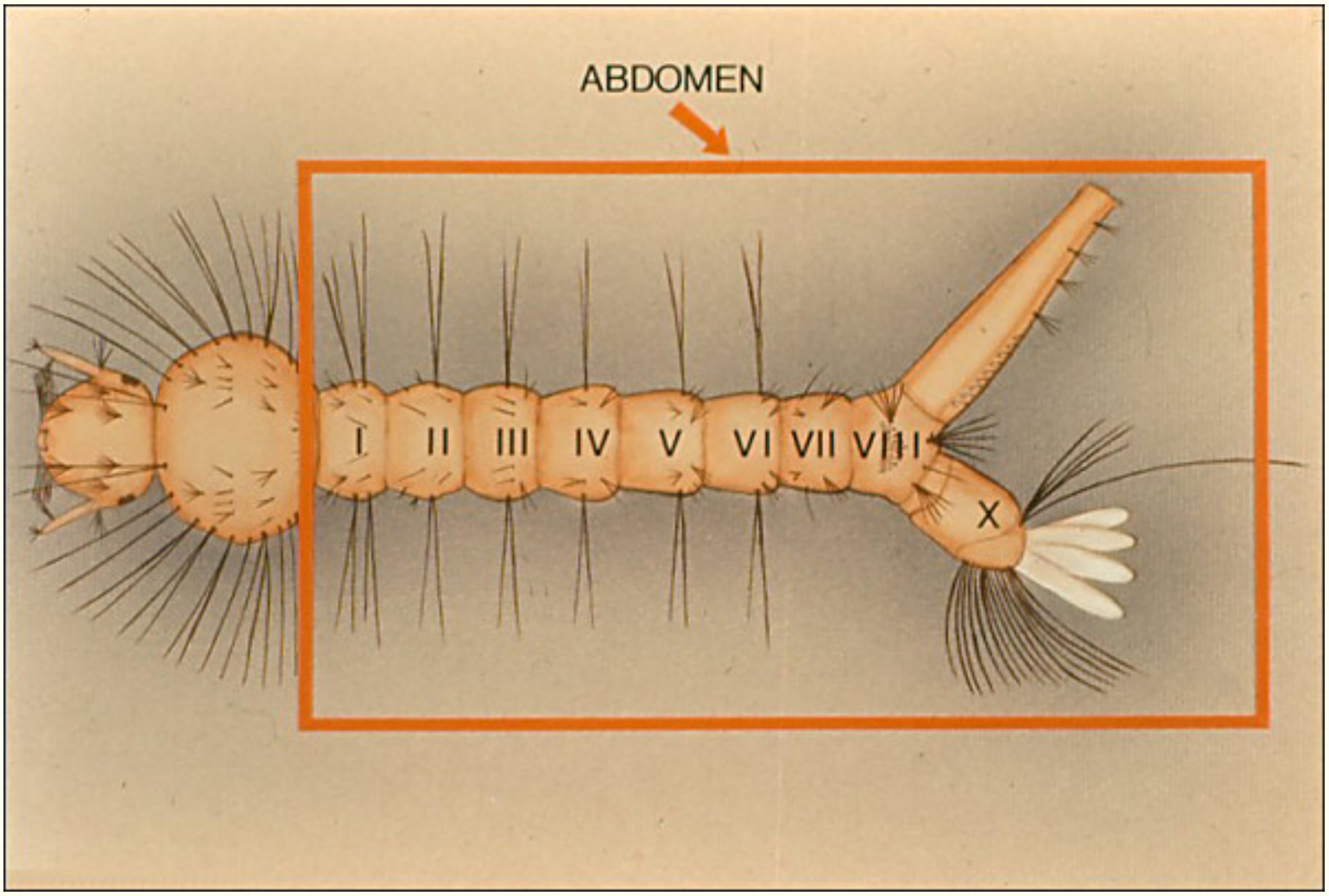

The abdomen consists of 10 segments, of which I-VIII and X are well defined.

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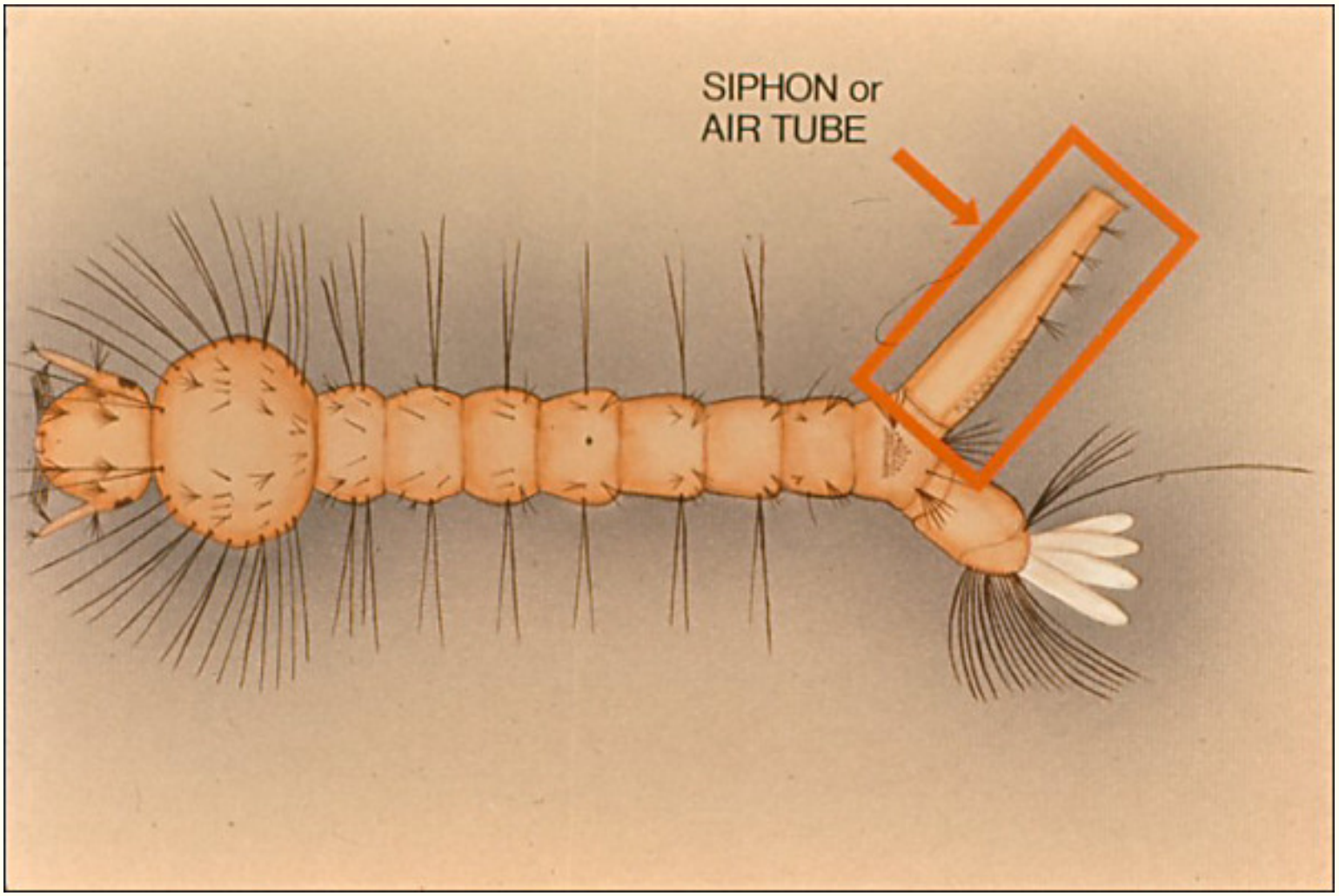

All except one genus of mosquitoes have a siphon or air tube on the eighth abdominal segment.

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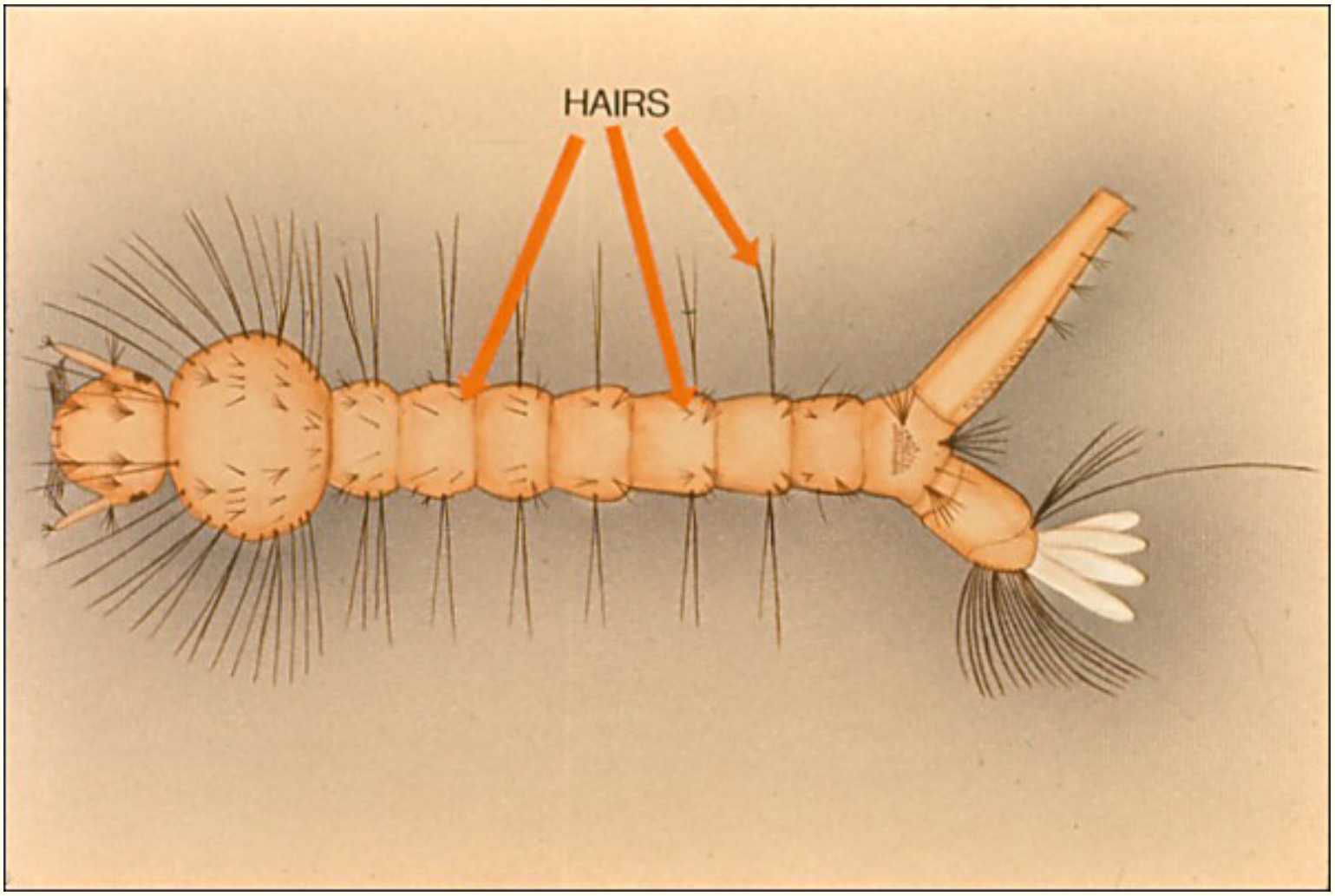

Numerous hairs occur on the body. The size, shape, number of branches, and arrangement of some of these hairs are important characters used in identifying mosquito larvae.

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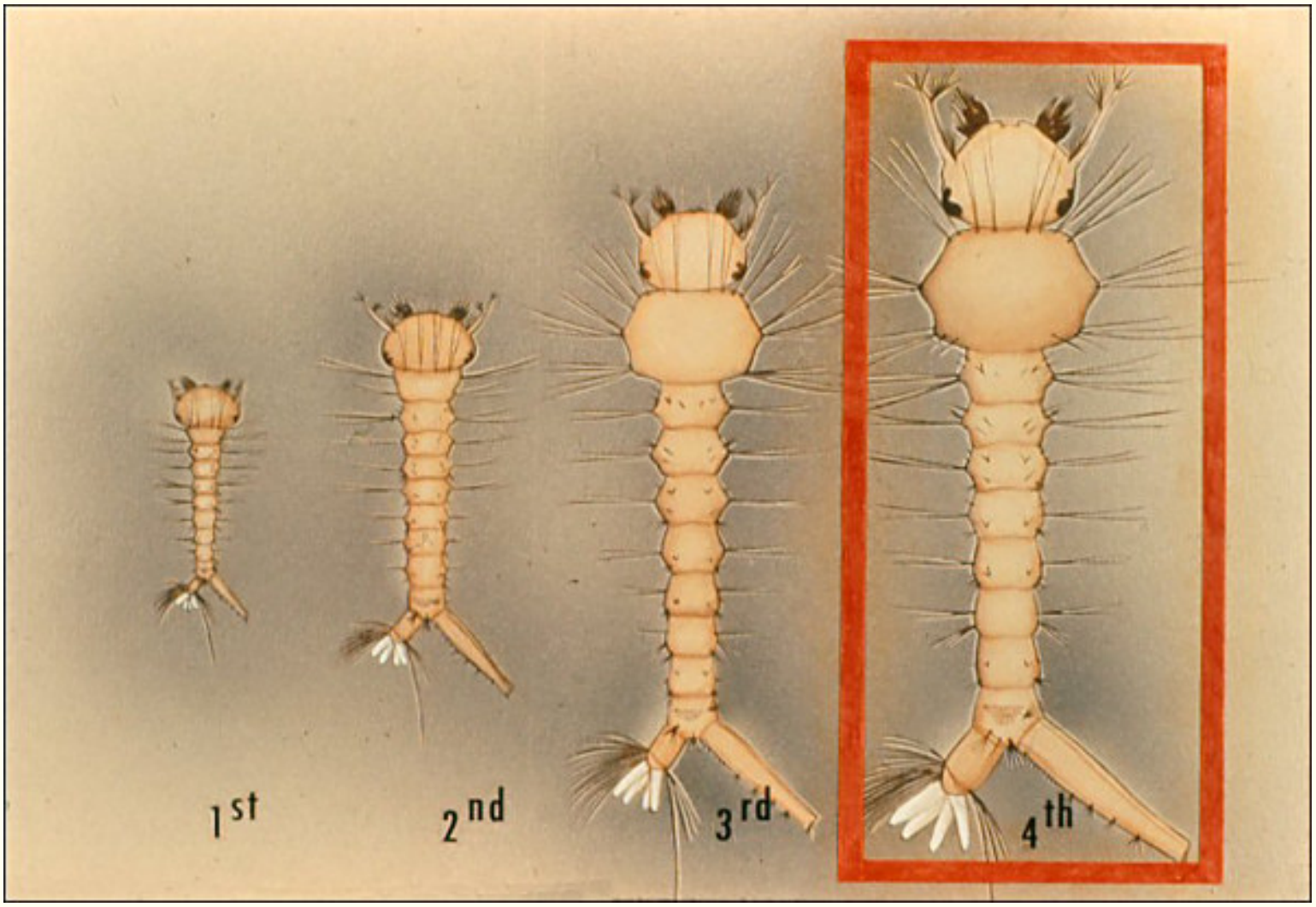
Slide 12



There are four stages of growth, or instars, in the development of mosquito larvae. The identifying characters used here apply only to the fourth instar.

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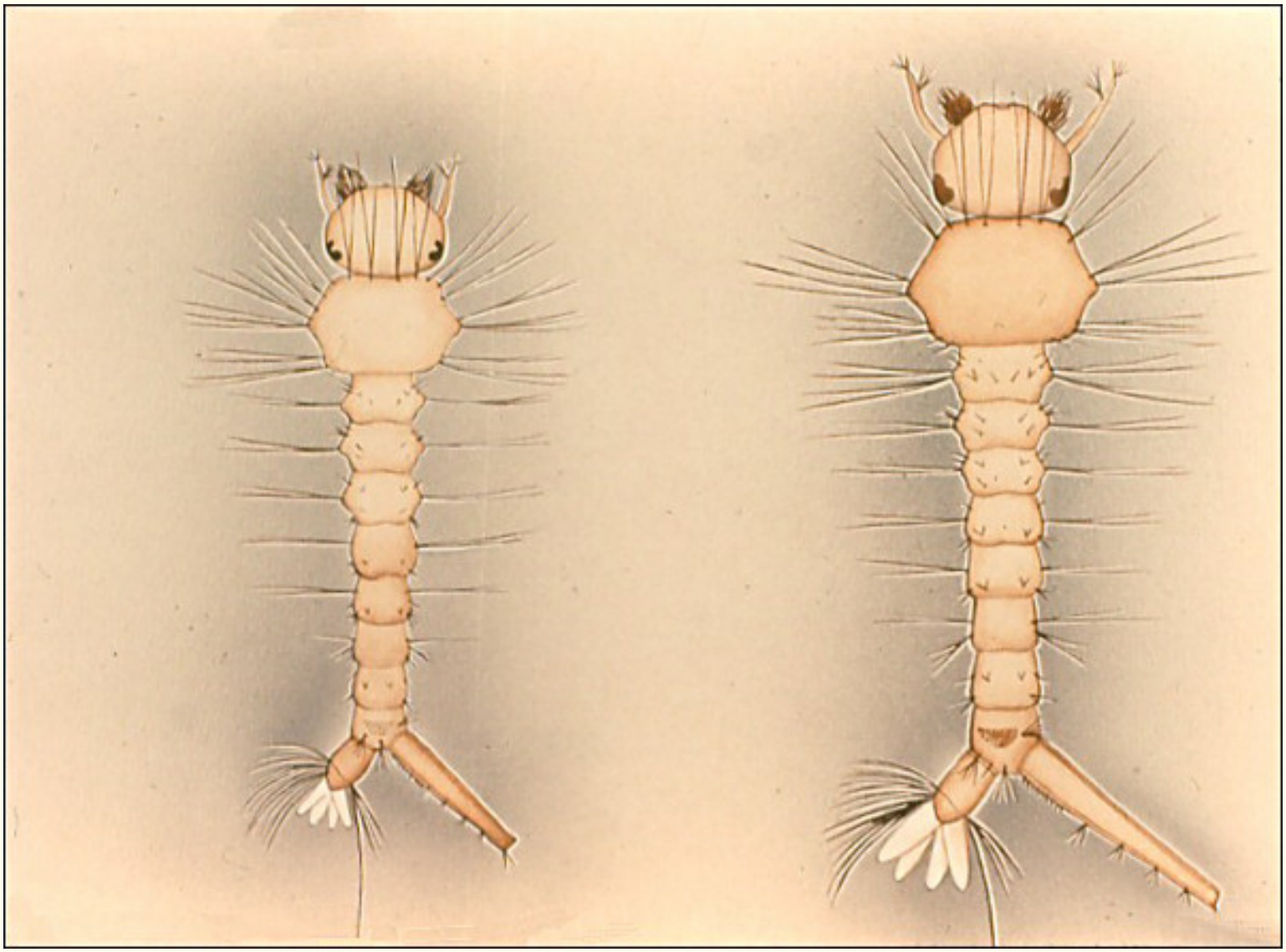

Until one is thoroughly familiar with the appearance of different instars of the various genera, some difficulty may be experienced in separating third from fourth instar larvae.

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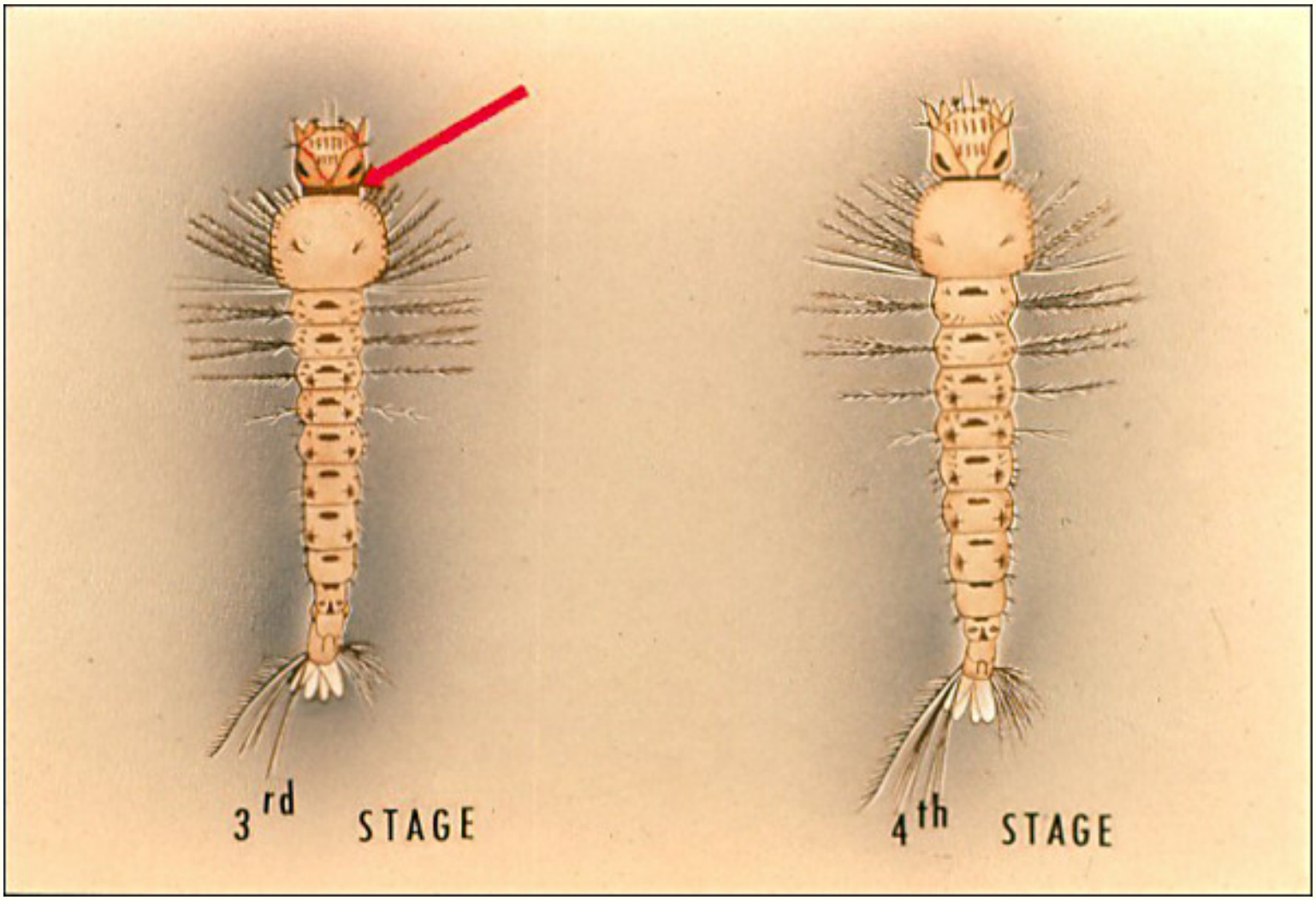

Third instar larvae of the genus *Anopheles* generally have a wide and heavily sclerotized collar on the posterior border of the head. Fourth instars have a smaller, less prominent collar.

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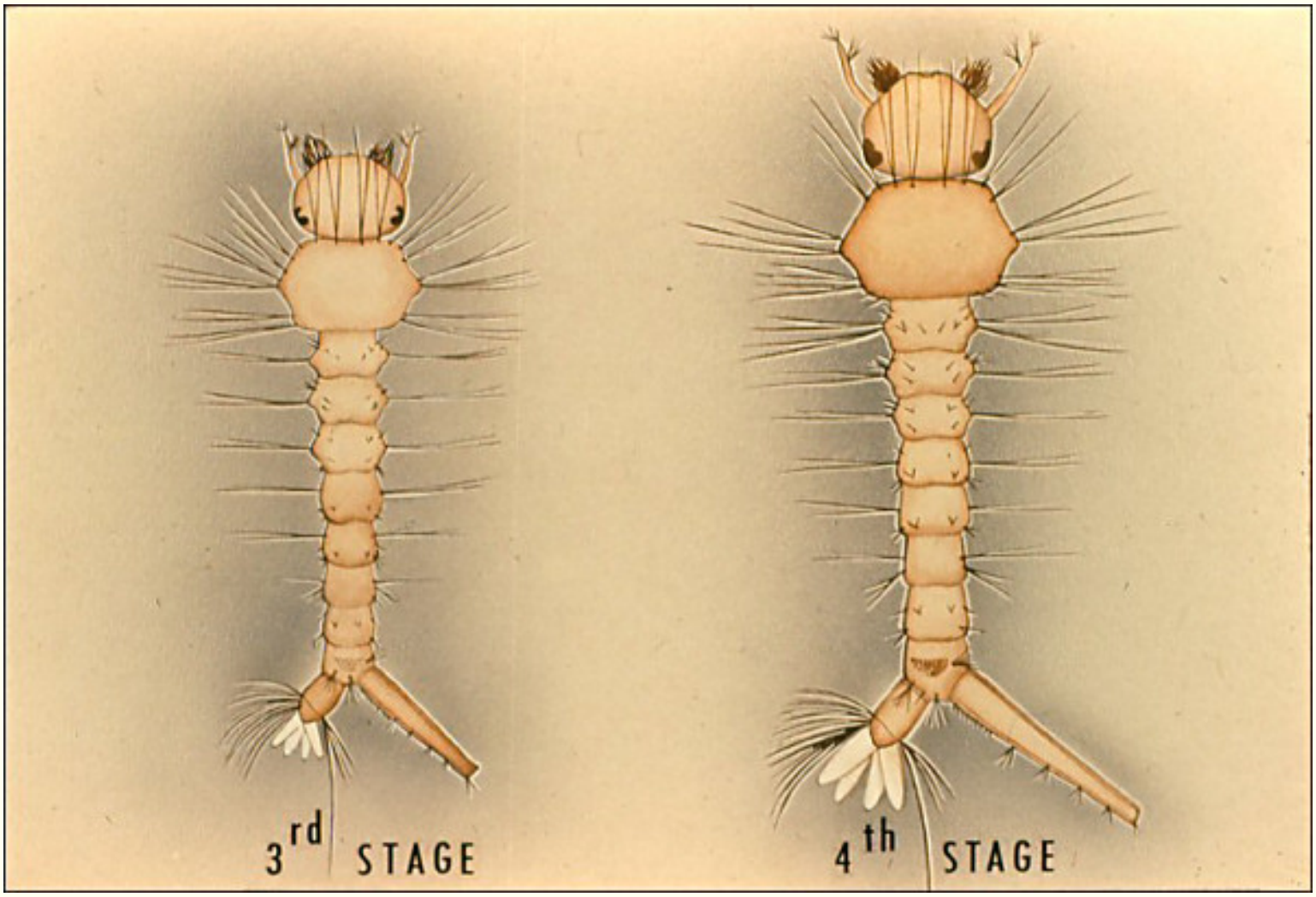

Instars of other genera are more difficult to determine. Experience in the field and laboratory is essential before third and fourth instars can be differentiated easily.

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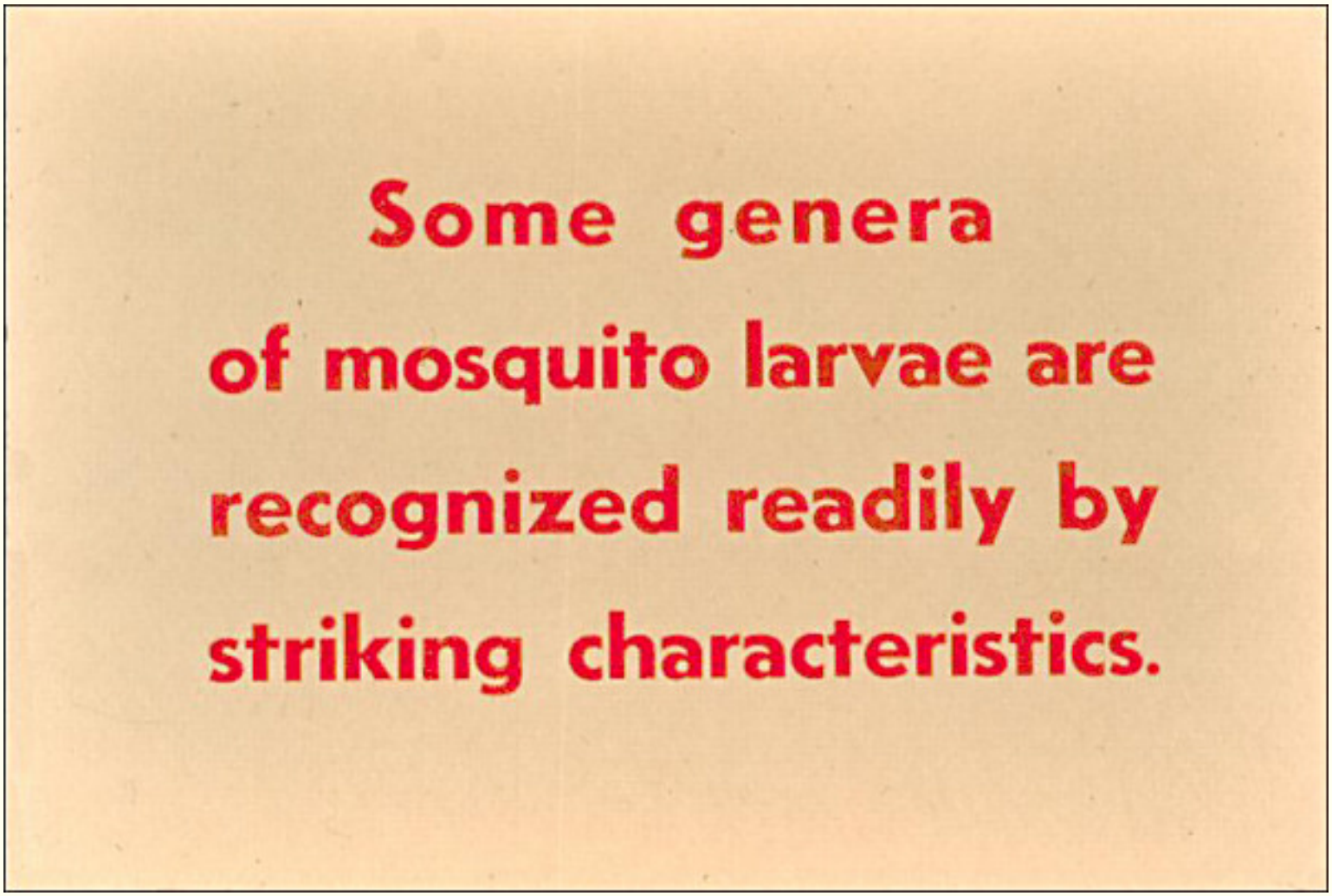

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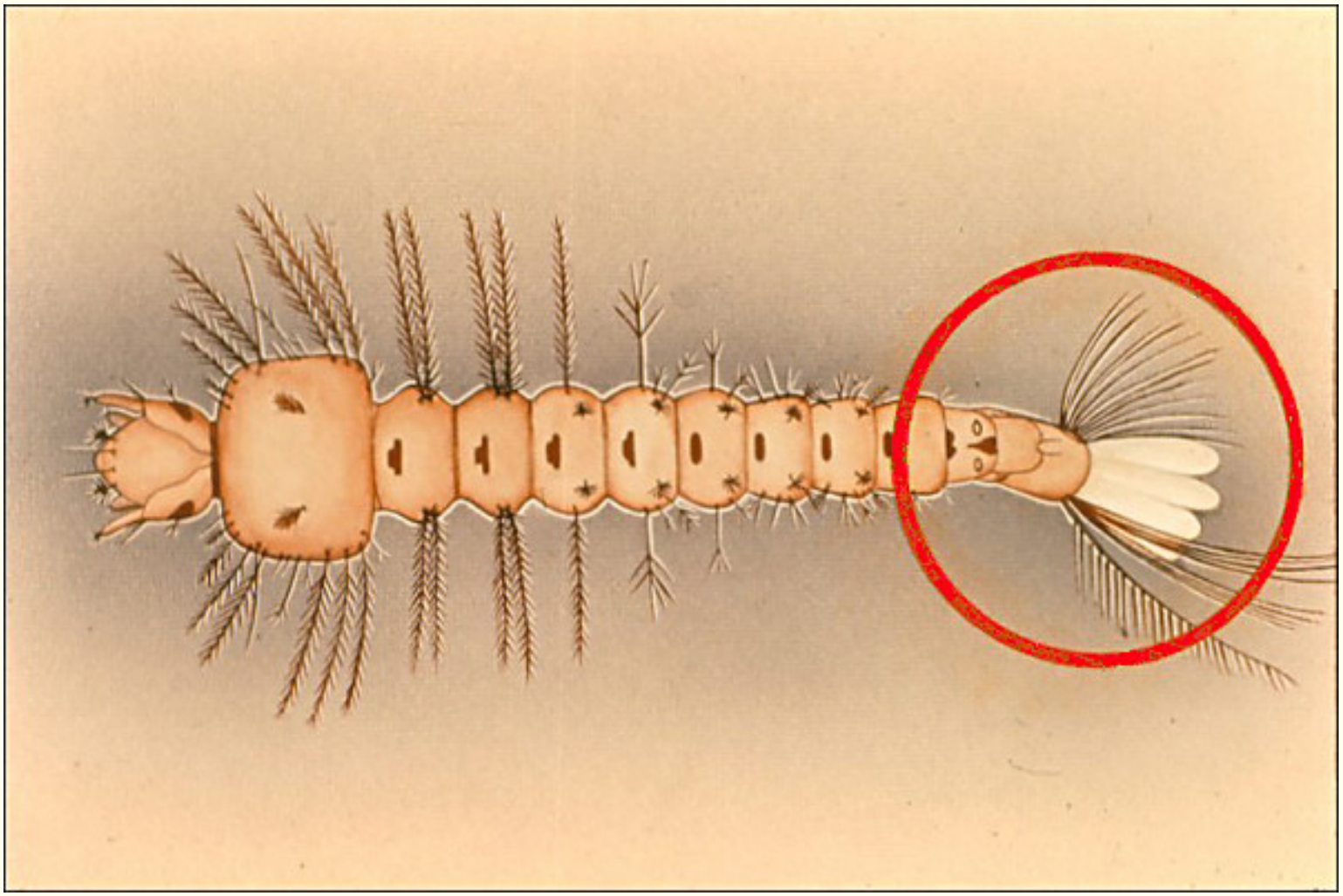

Note here that the eighth abdominal segment does not bear a siphon

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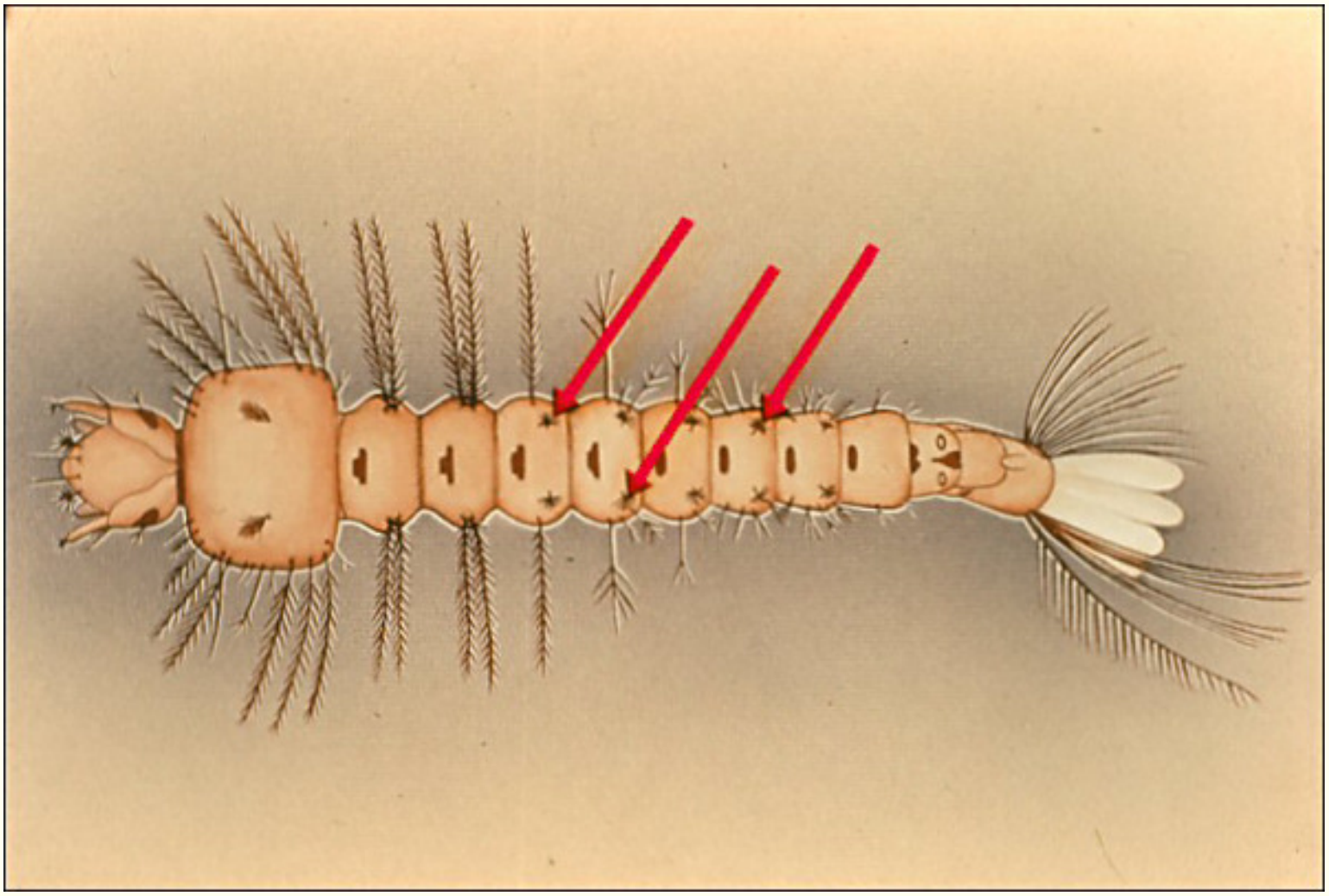

and that palmate or float hairs are present on at least some abdominal segments.

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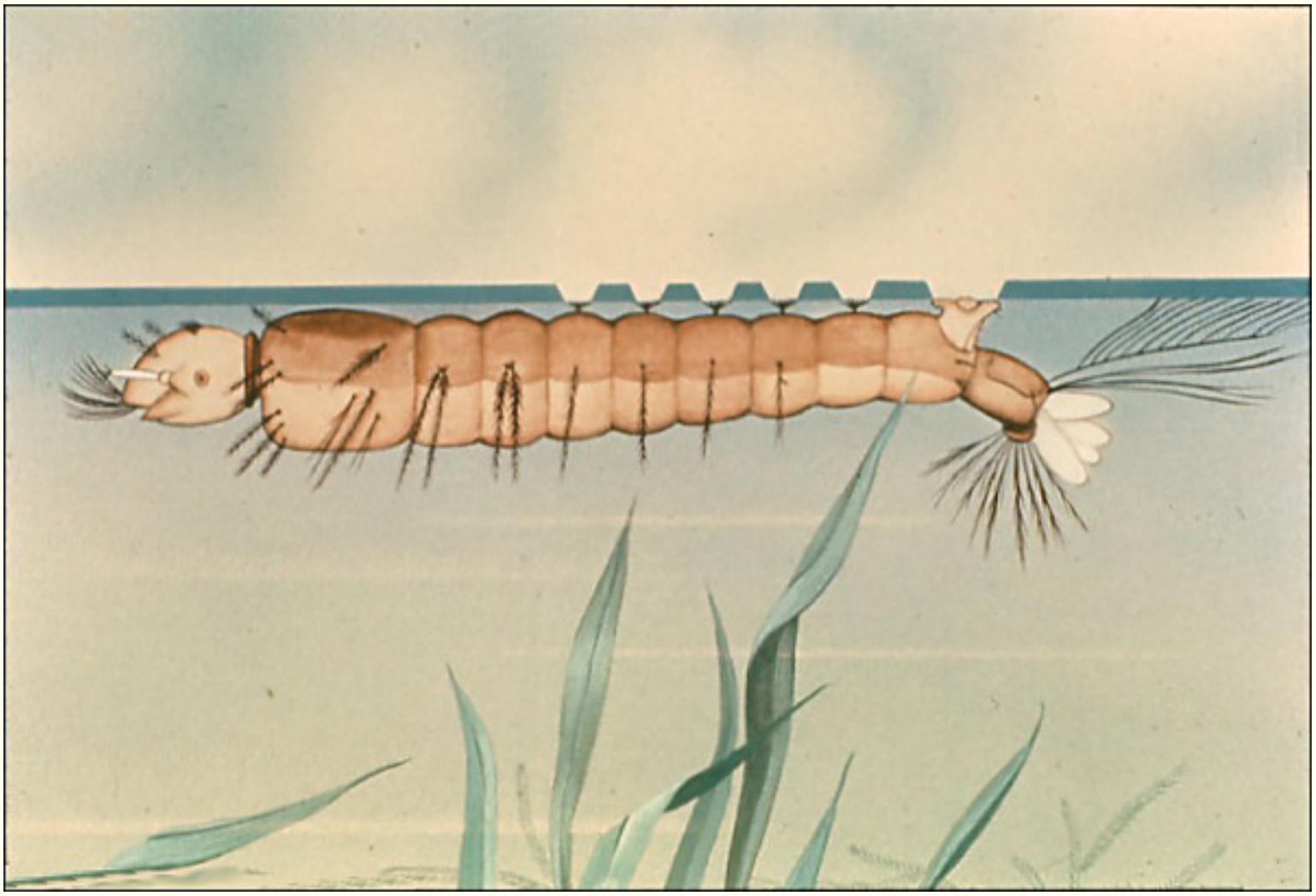

These specialized hairs hold the larva parallel to the water surface, in a characteristic horizontal position.

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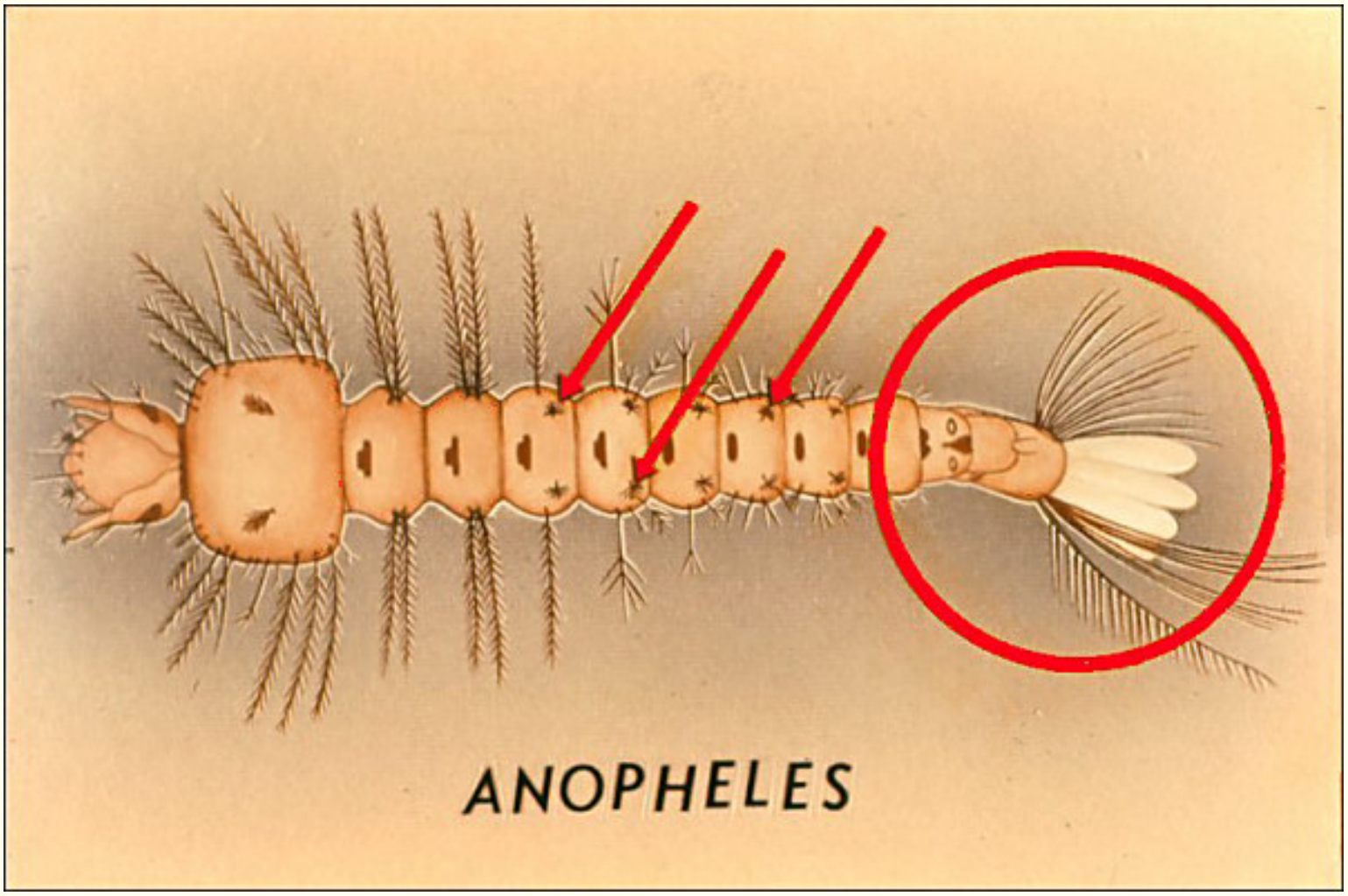

These characters identify an important genus of disease-transmitting mosquitoes, the genus *Anopheles*.

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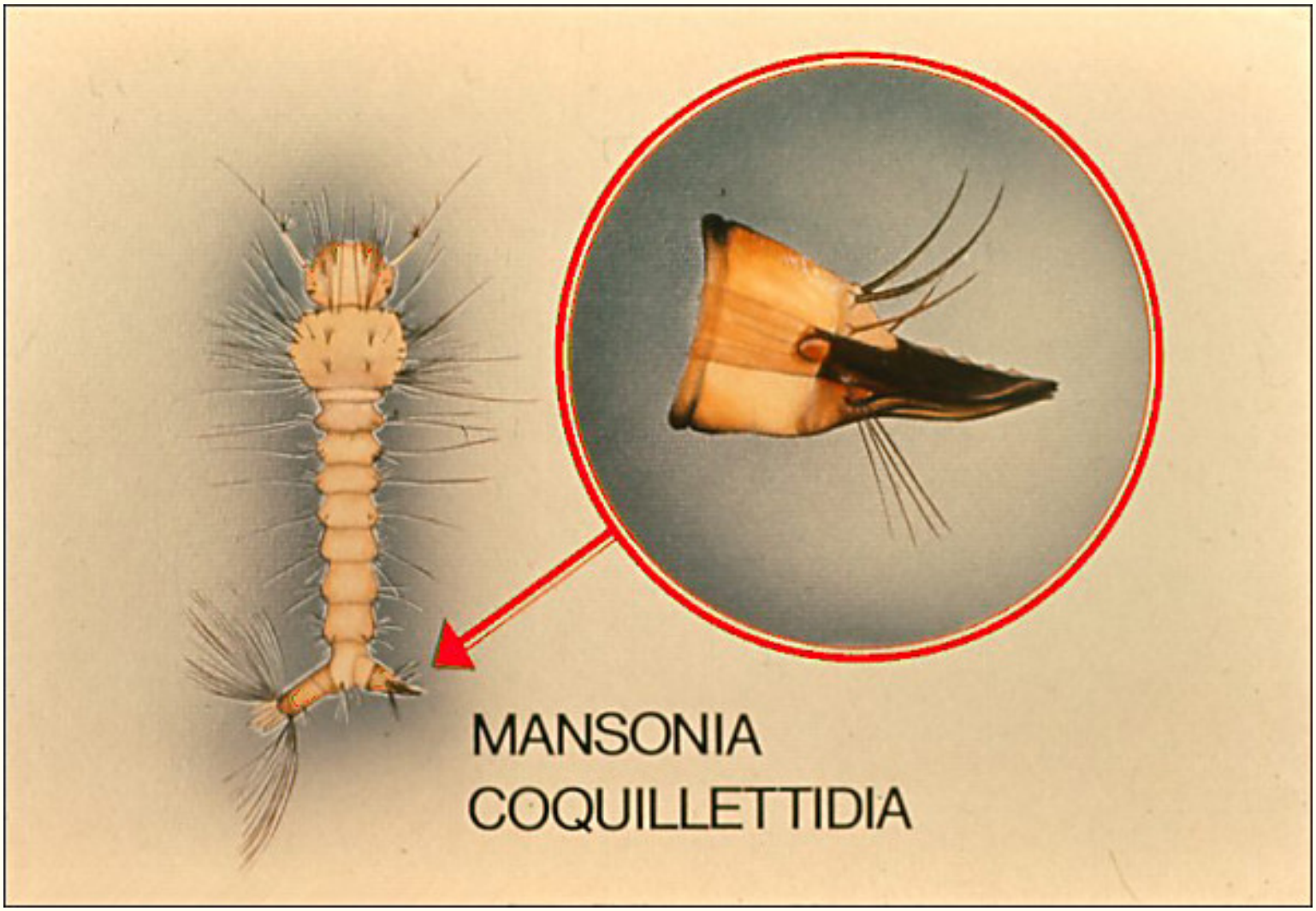

The genera *Mansonia* and *Coquillettidia* are distinguished by the radically modified siphon.

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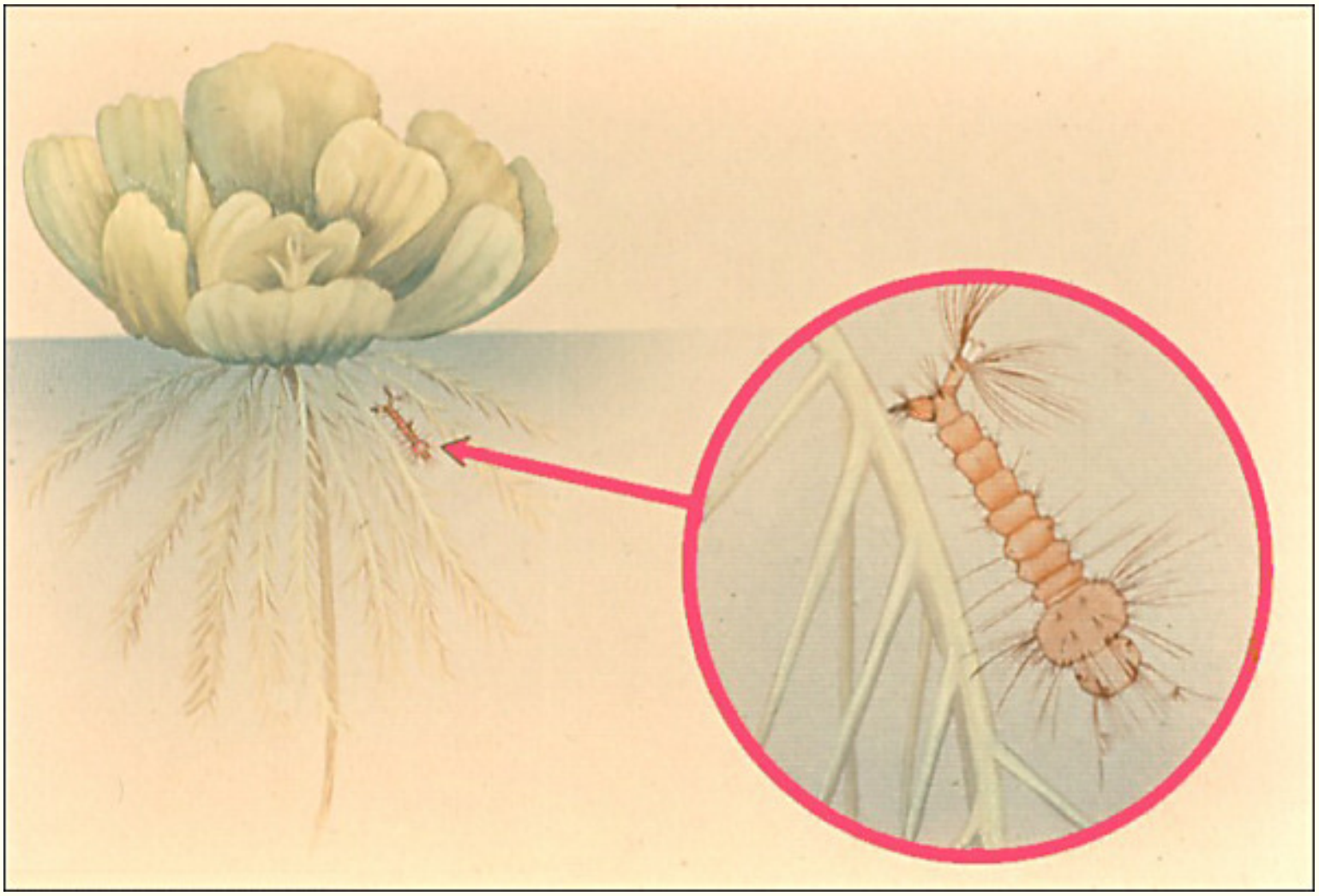

This siphon is adapted to penetrate the tissue of aquatic plants from which air is obtained, thus enabling the larvae to remain below the water surface at all times.

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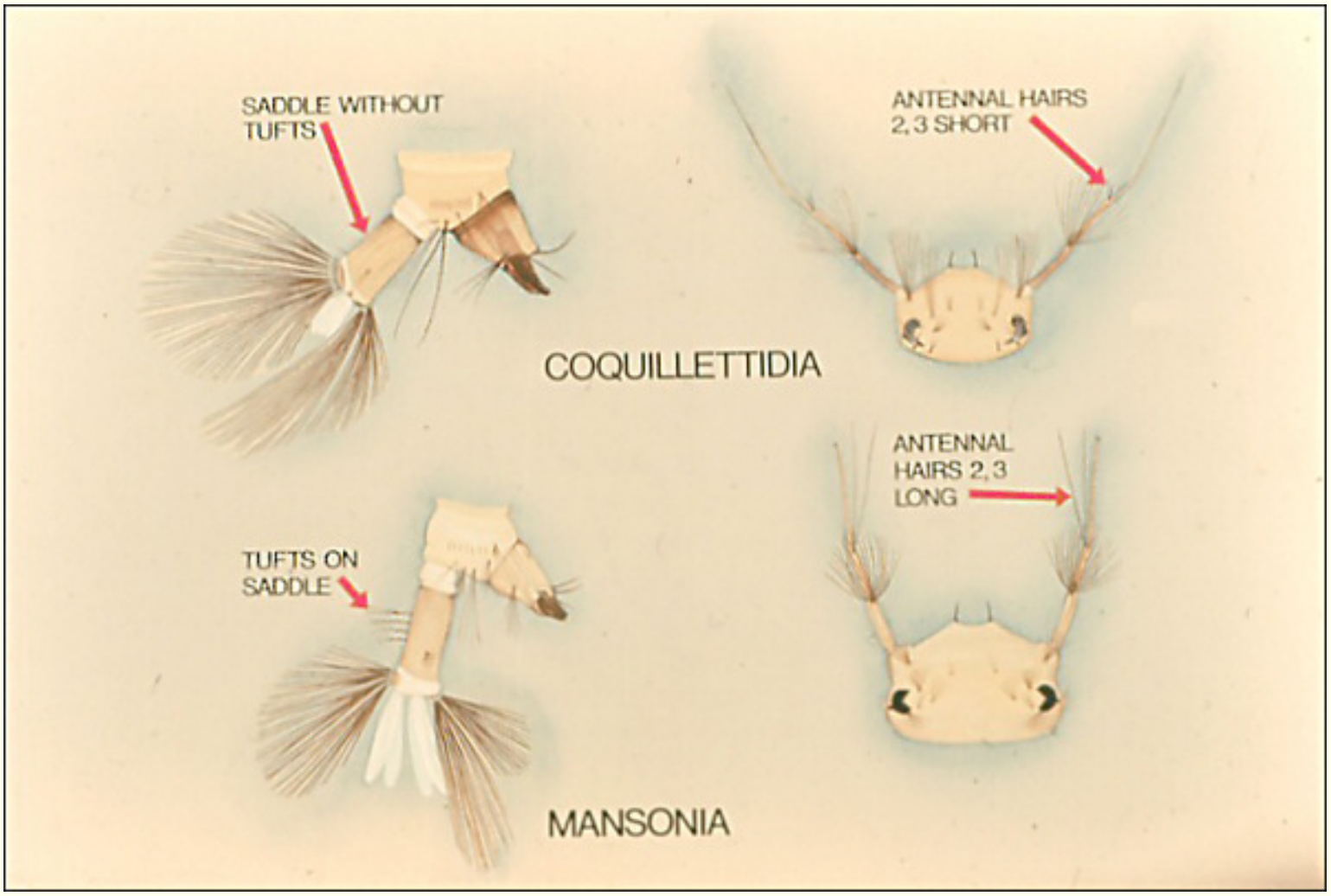

Coquillettidia and *Mansonia* may be differentiated by characters on the anal segment and the antenna.

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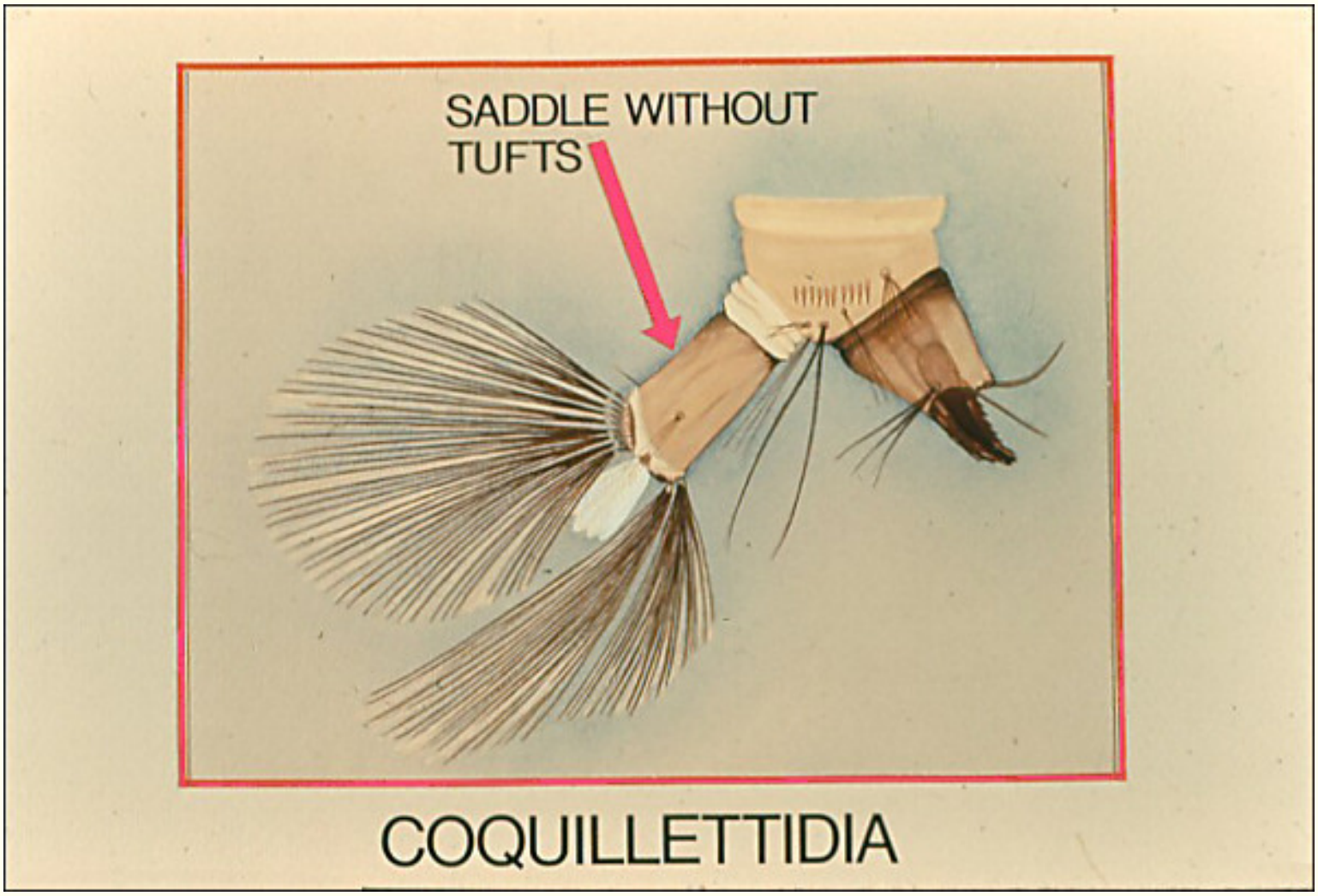

The anal segment of *Coquillettidia* does not bear prominent hair tufts on the ventral aspect of the saddle, although one or two small hairs may be present posteriorly. Also there are usually eight or more comb scales on abdominal segment VIII in this genus.

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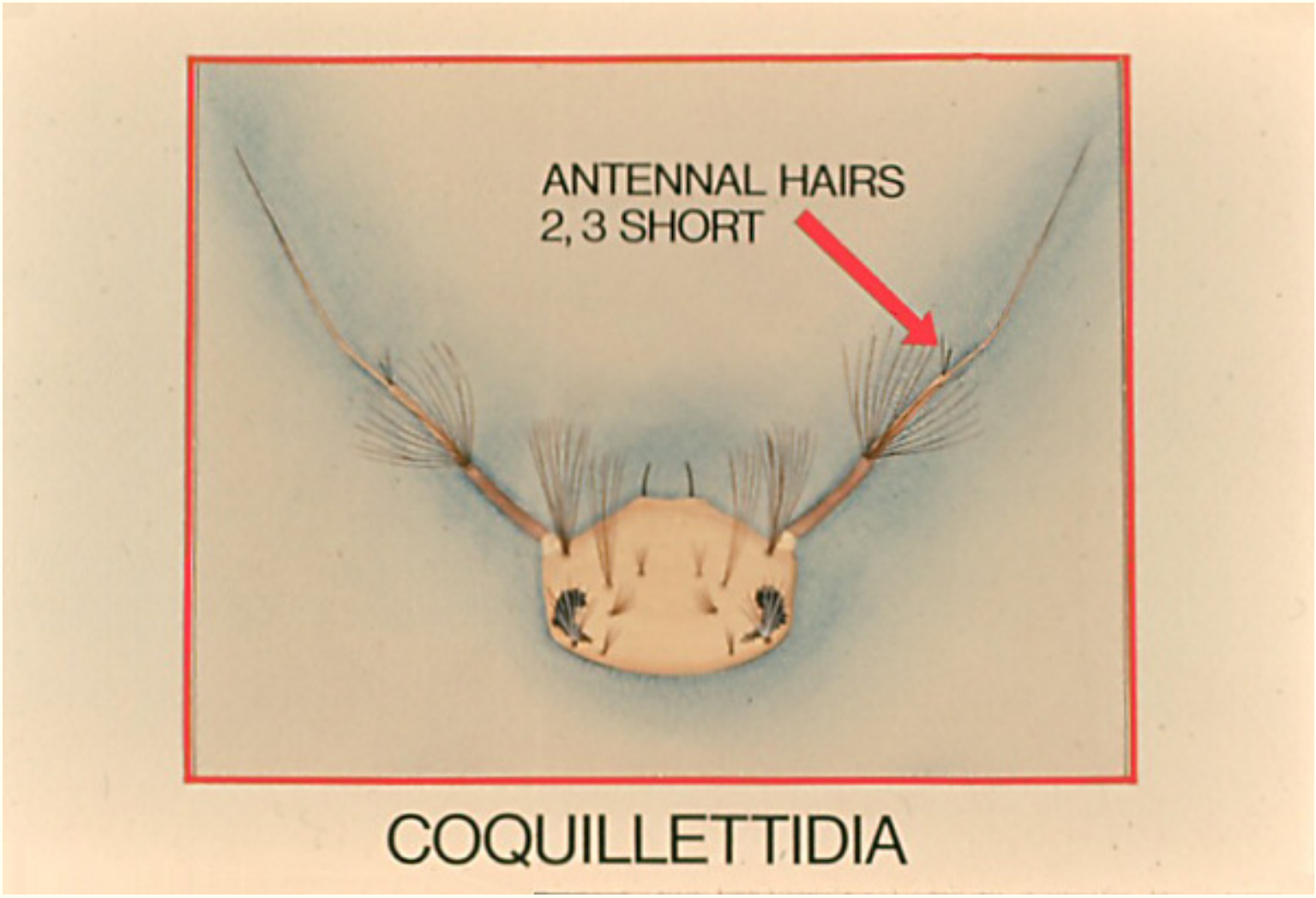

Hairs 2 and 3 on the *Coquillettidia* antenna, which divide the apical flagellar segment from the basal segment, are small. Also the flagellar segment is longer than the basal segment.

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The anal segment of *Mansonia* bears four prominent hair tufts on the ventral aspect of the saddle. Comb scales on abdominal segment VIII usually number less than eight.

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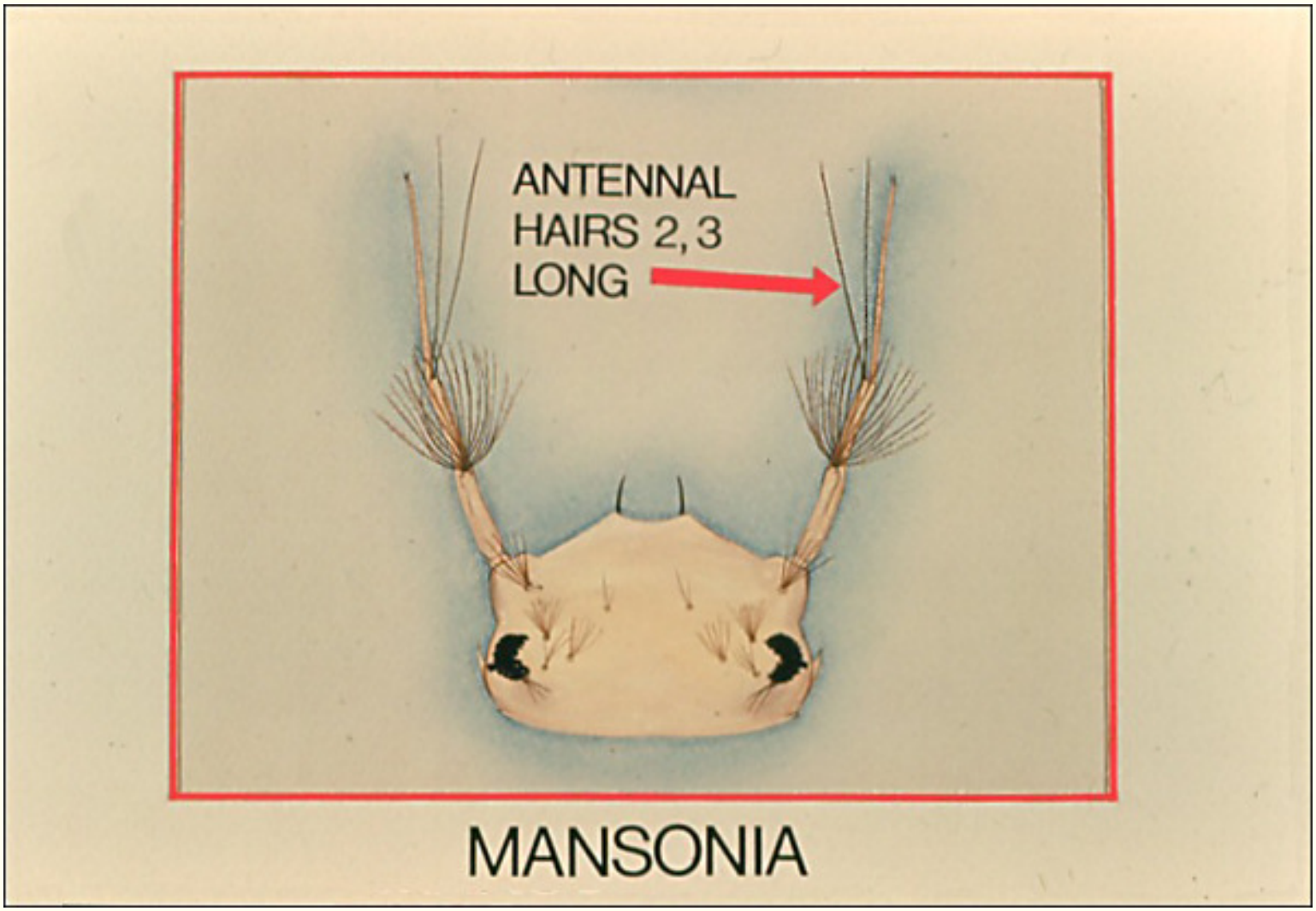

Antennal hairs 2 and 3 are very long in *Mansonia*, usually longer than the flagellar segment, which is no longer than the basal segment.

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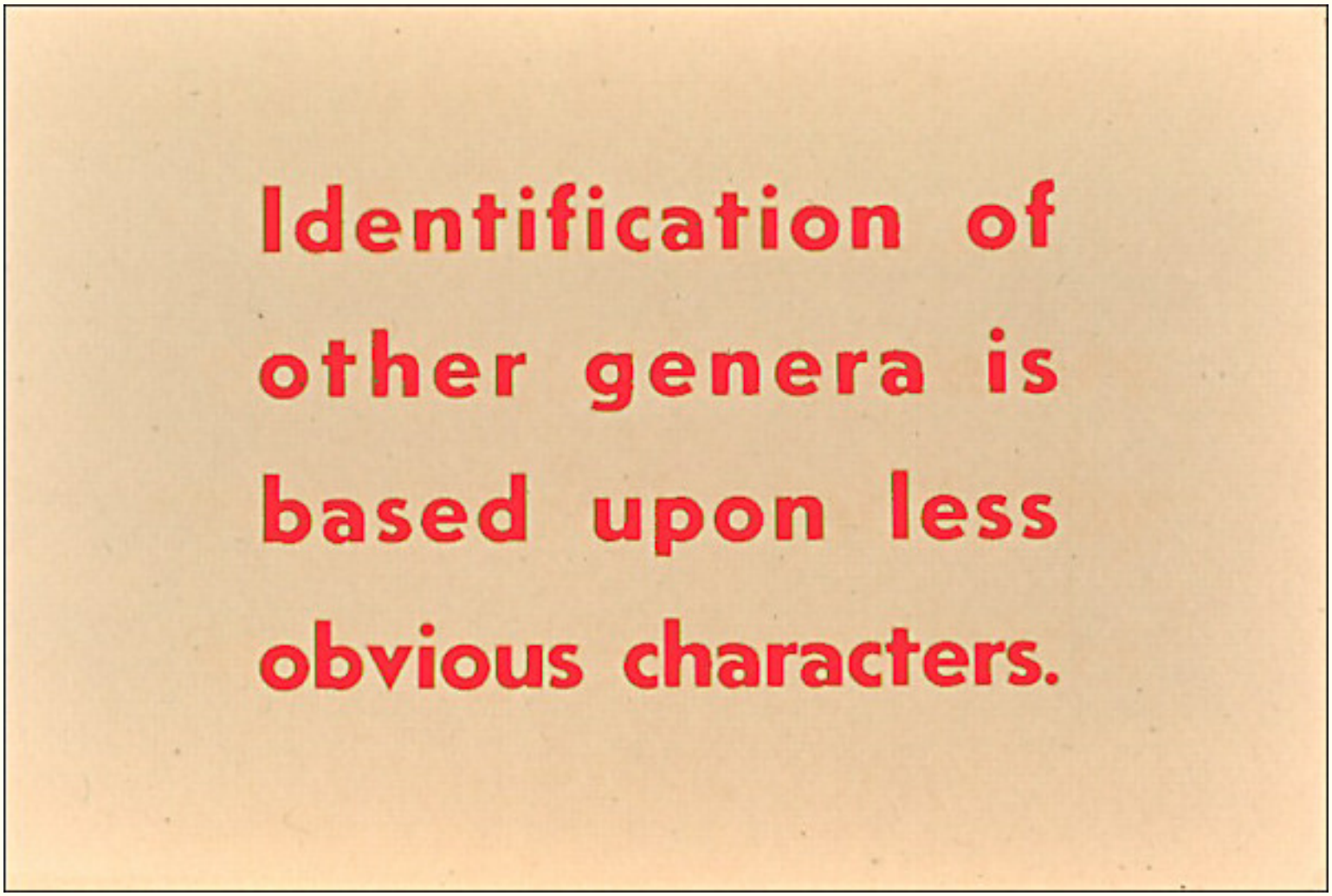

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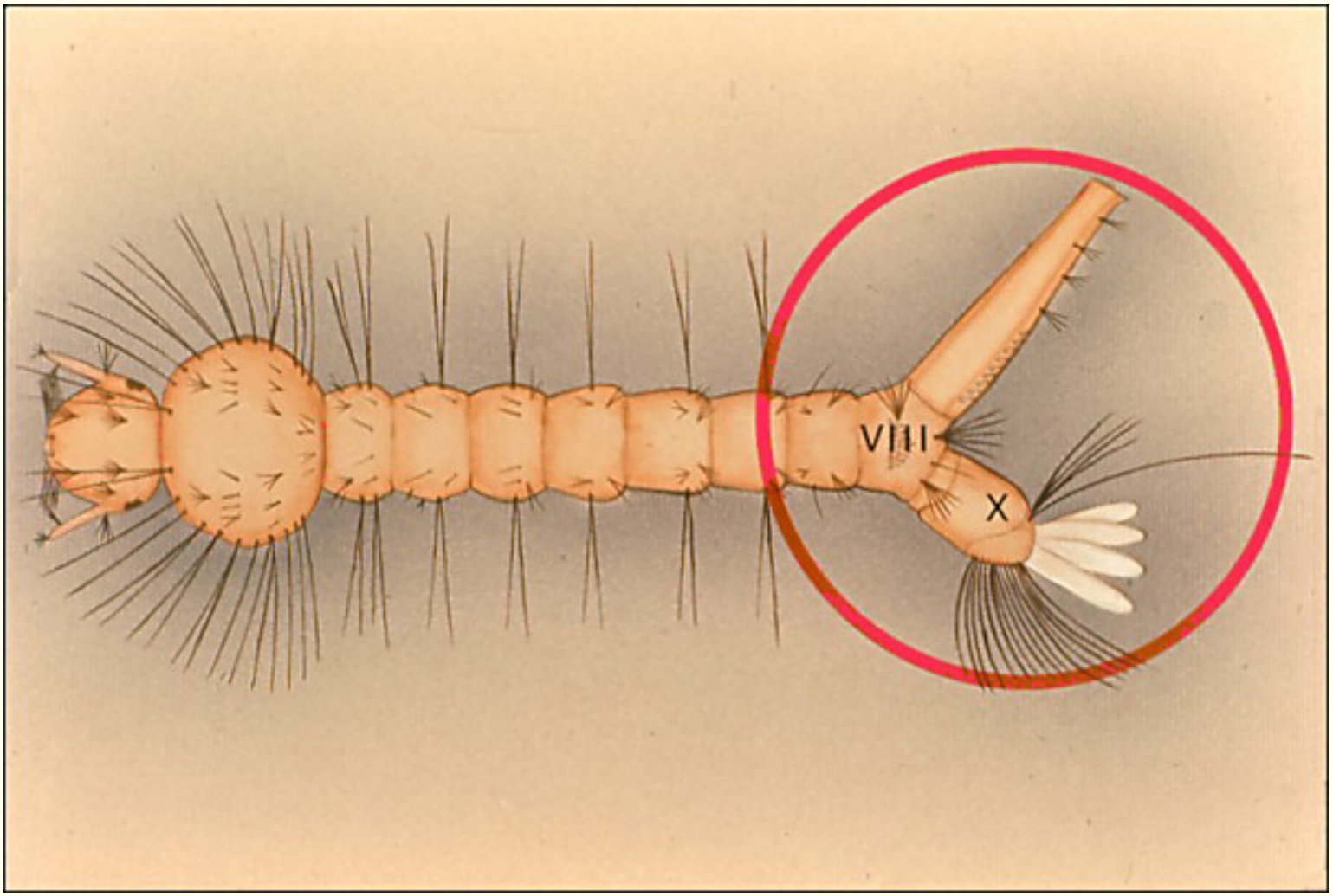

Structures on the terminal abdominal segments may be used to identify some genera.

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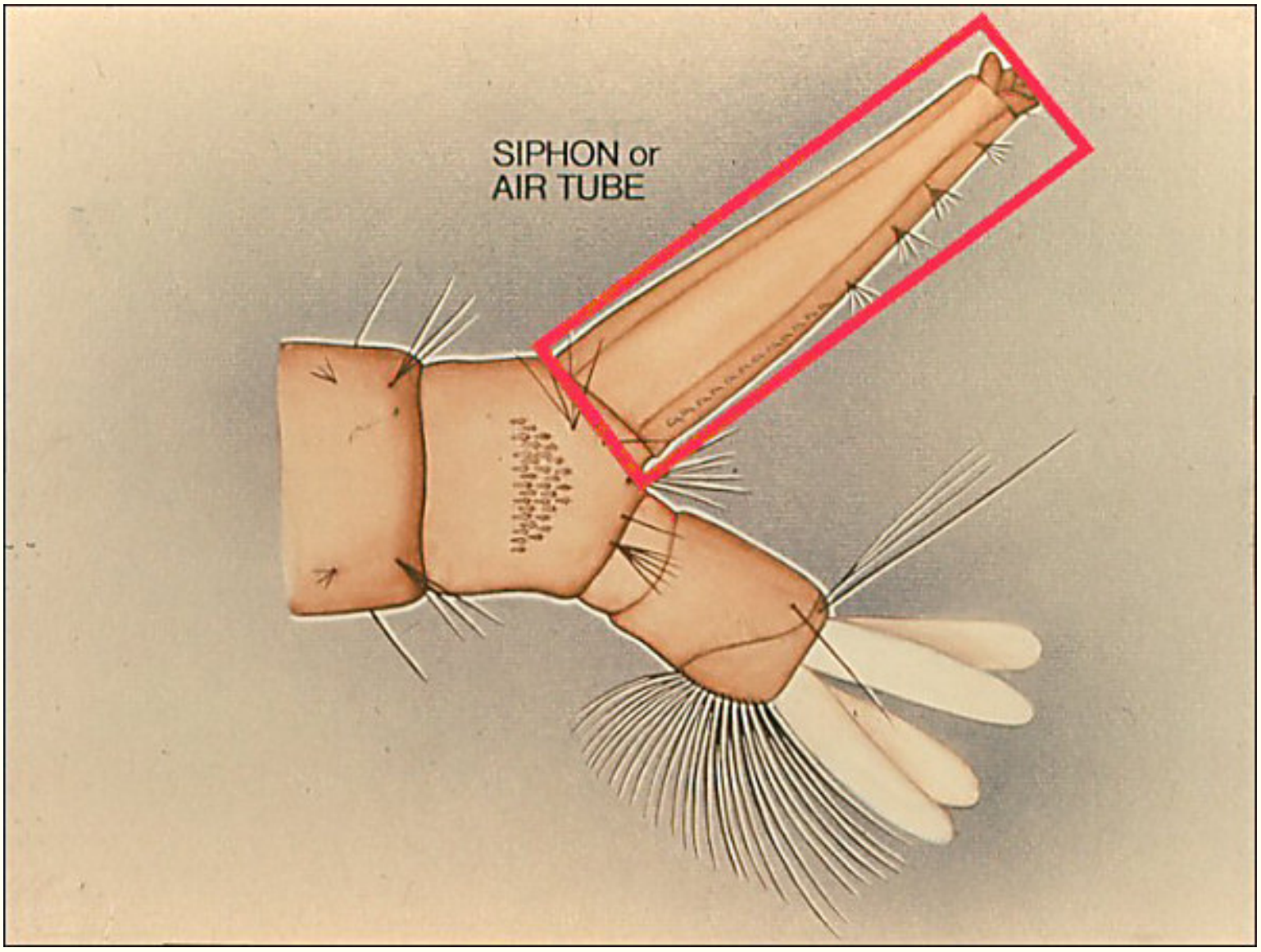

The siphon should be examined for occurrence and arrangement of diagnostic hairs and spines.

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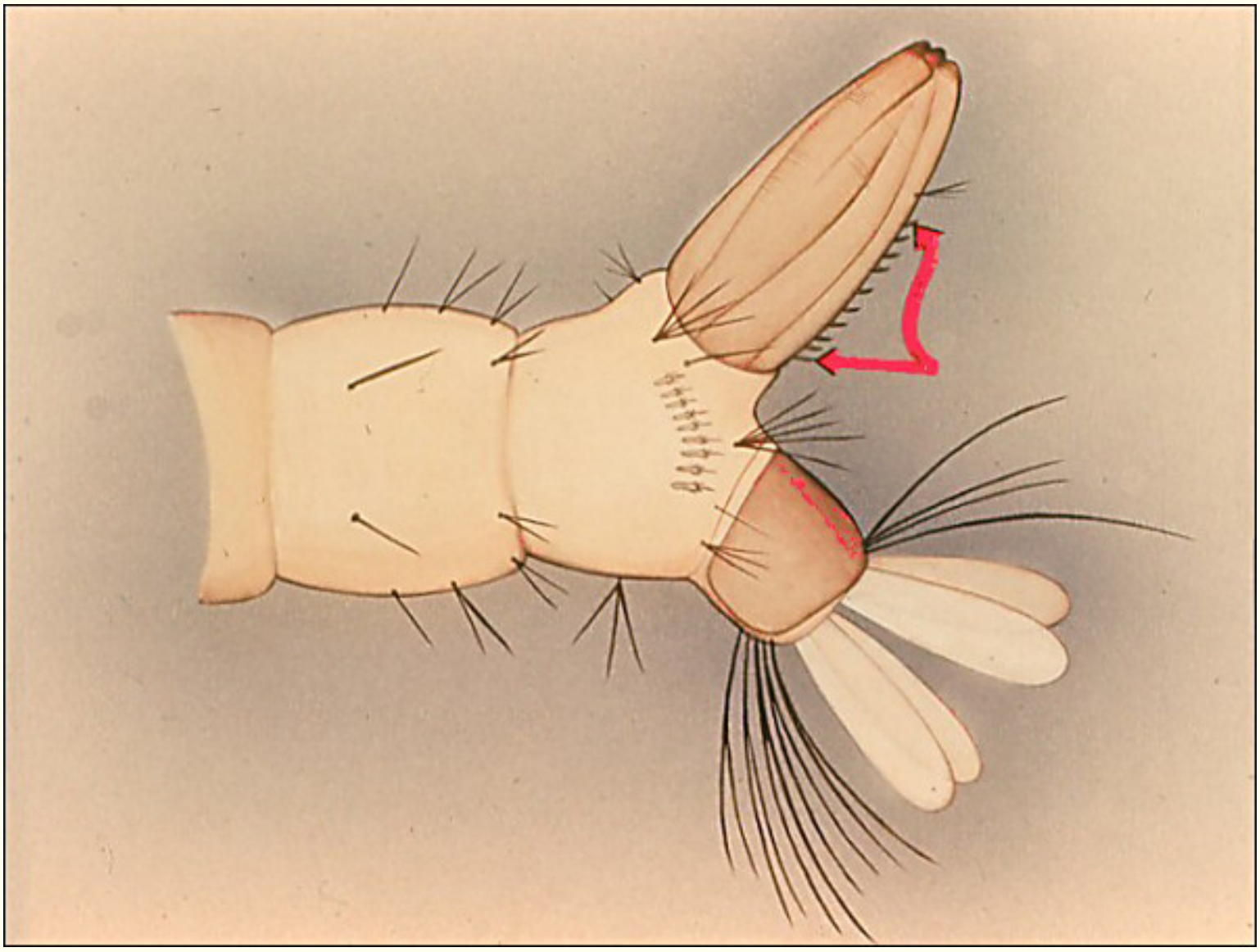

There may be a row of closely set teeth or spines on each side of the siphon near the ventral margin.

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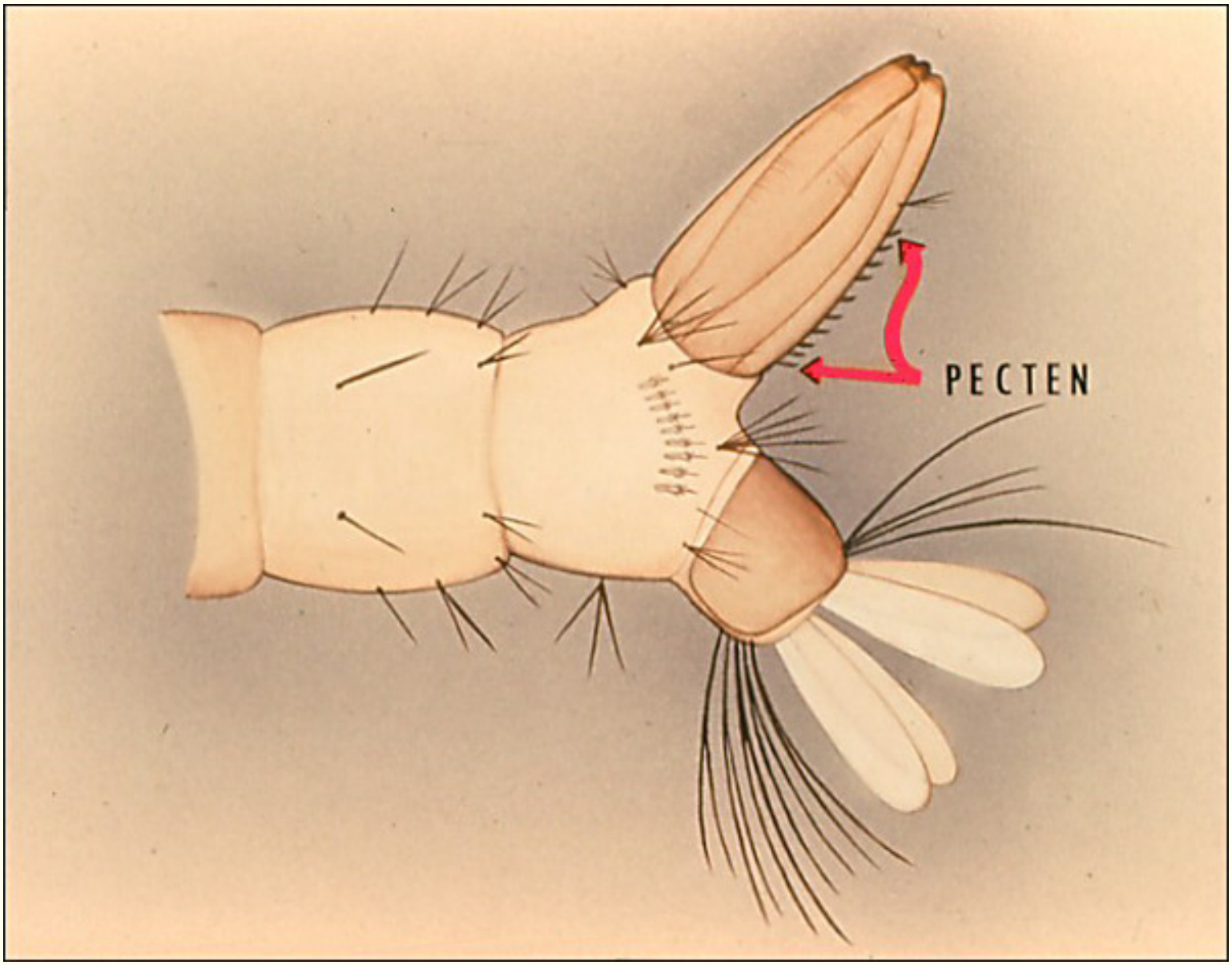

This is the pecten.

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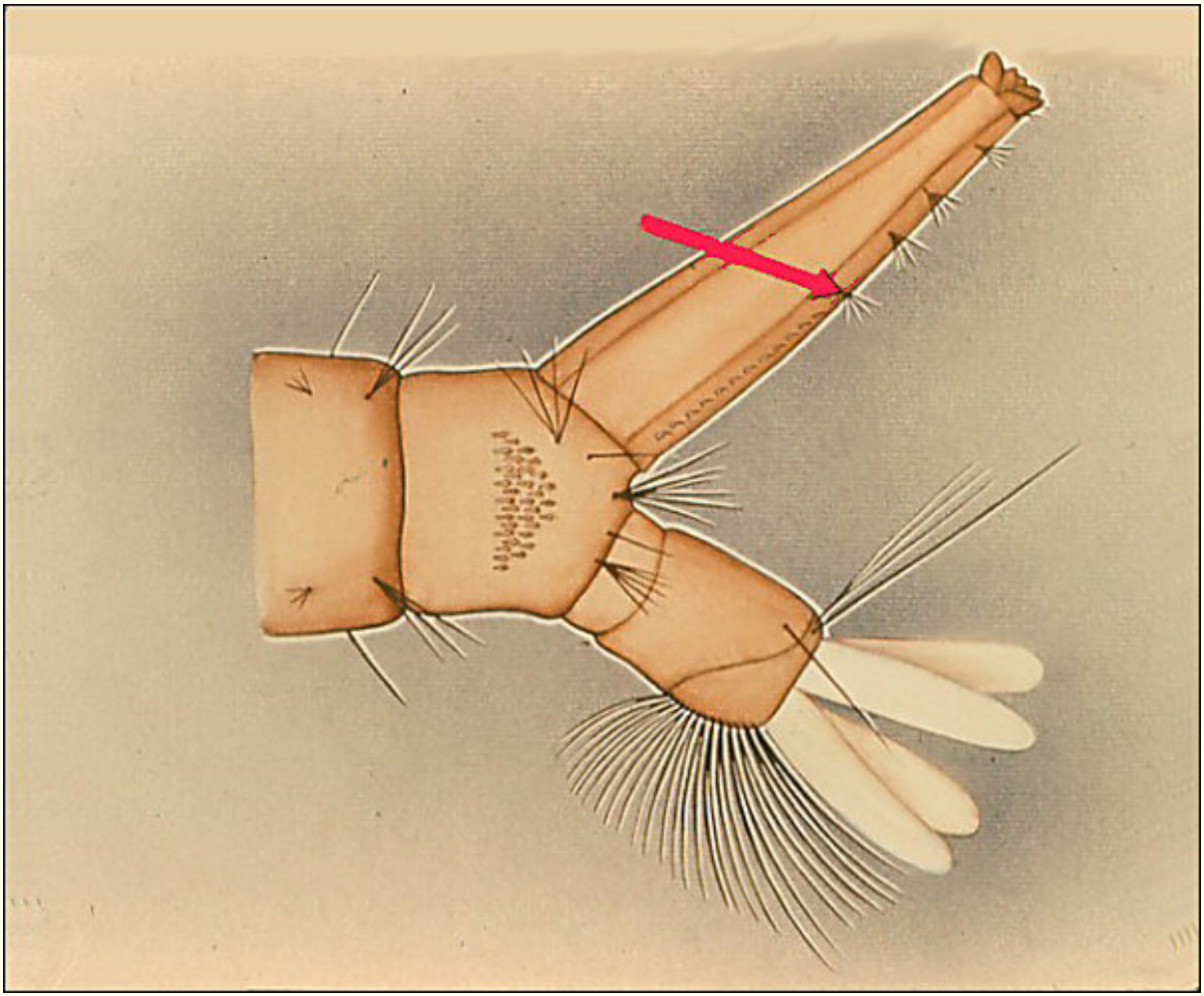

There may be one or more scattered hairs or tufts of hairs along the

sides of the siphon beyond the pecten.

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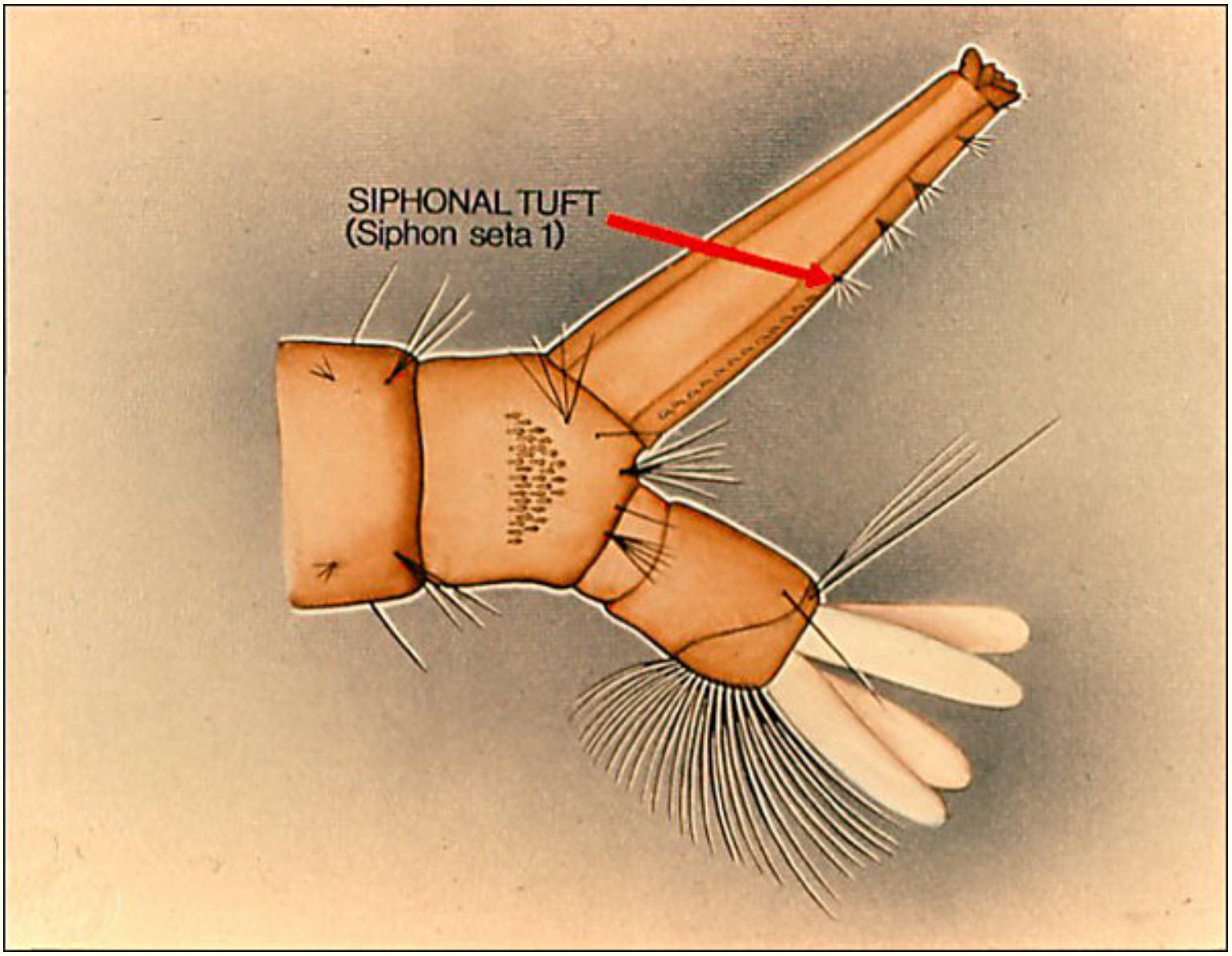

These are siphonal tufts or setae.

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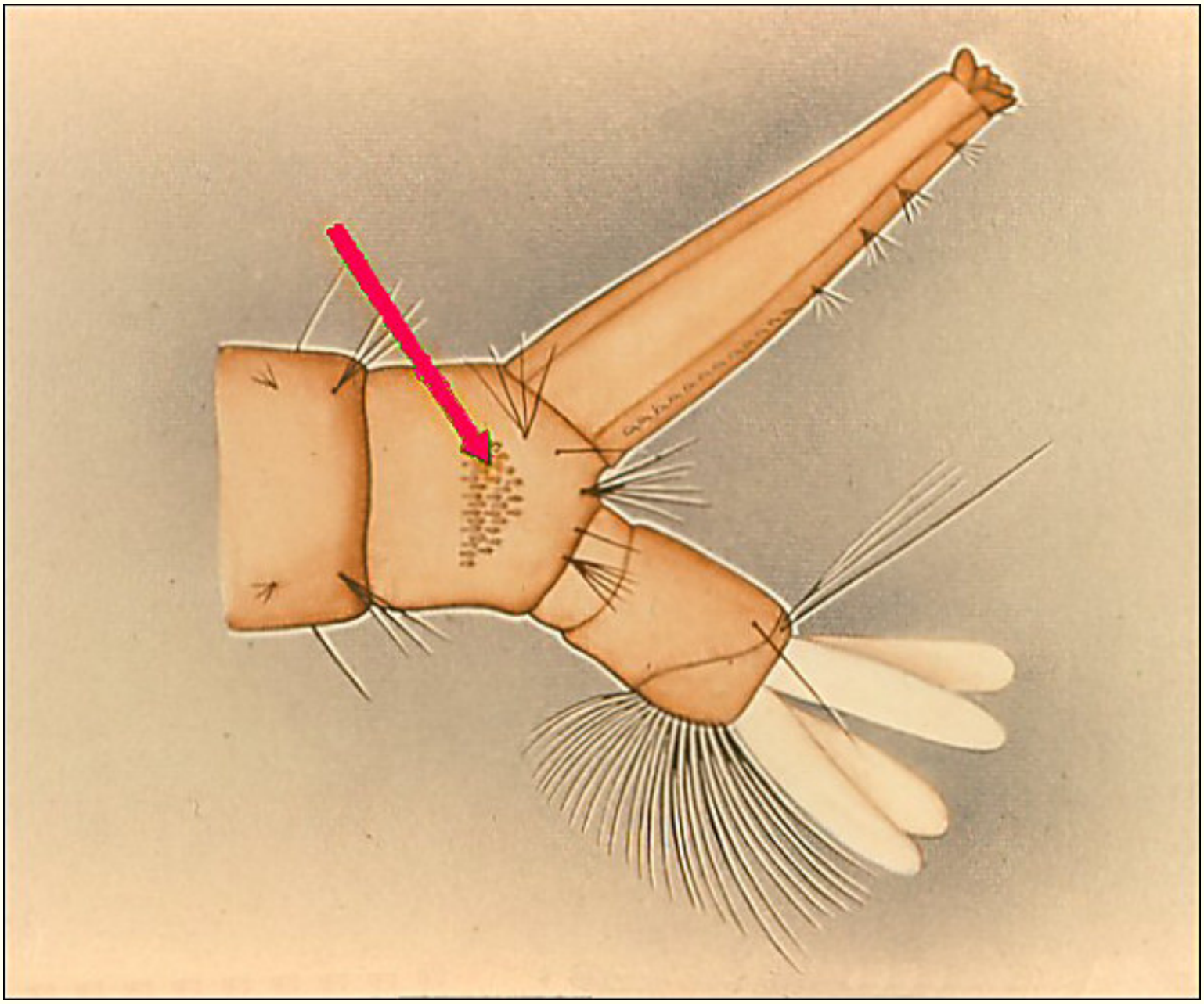

A prominent patch of scales occurs on each side of the eighth

abdominal segment in most genera.

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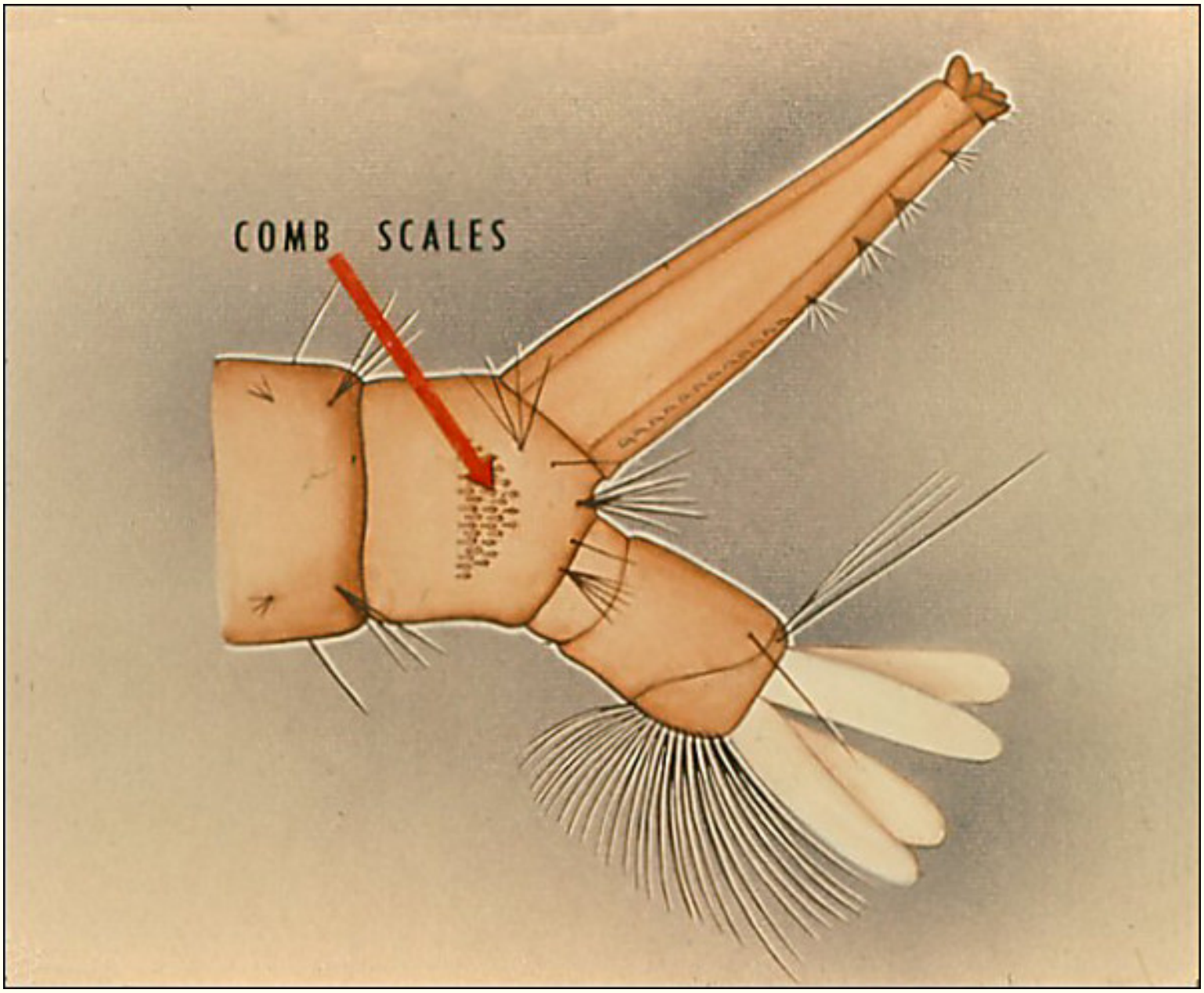

These are the comb scales.

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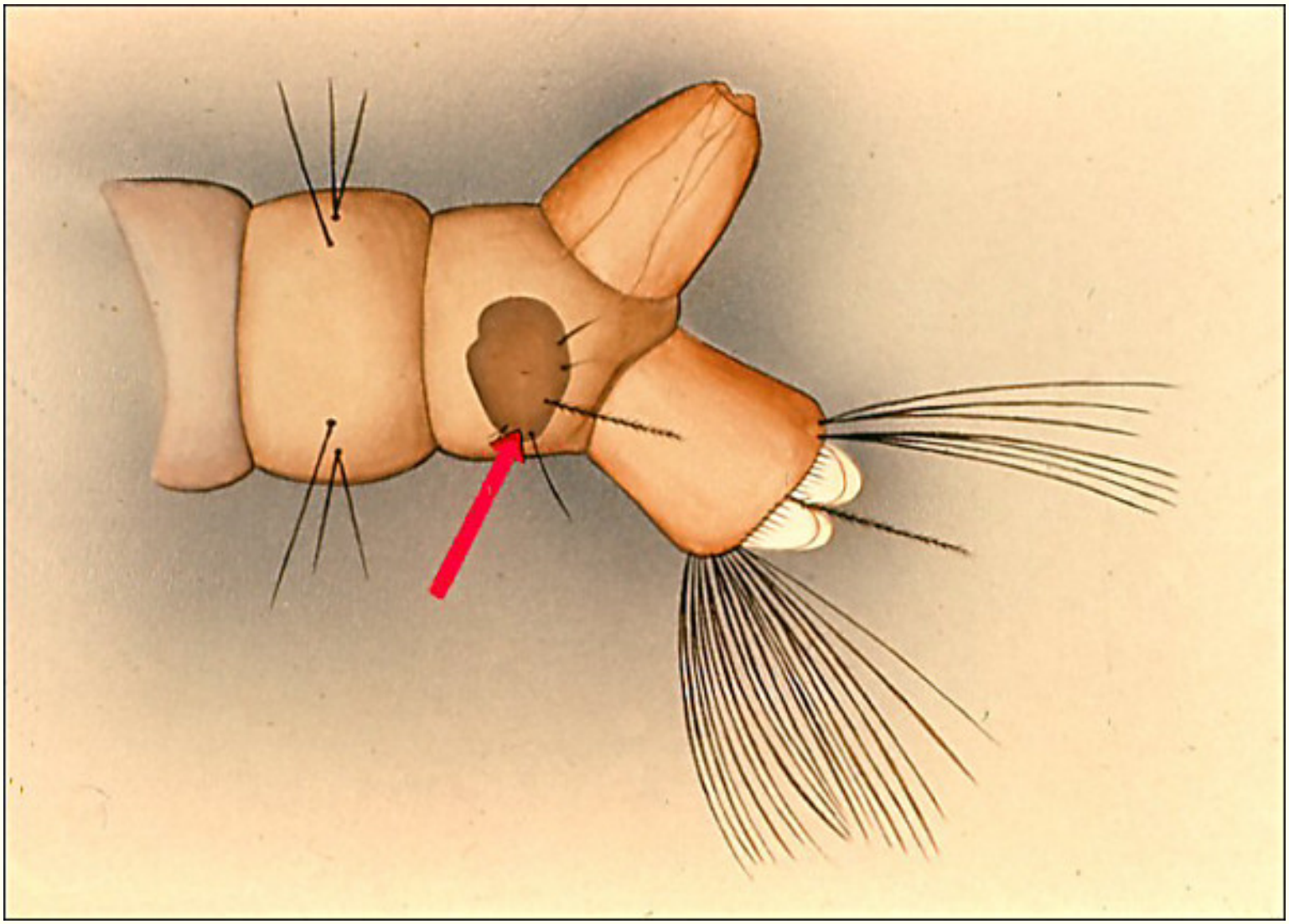

A sclerotized plate occurs laterally on the eighth abdominal segment in at least one genus.

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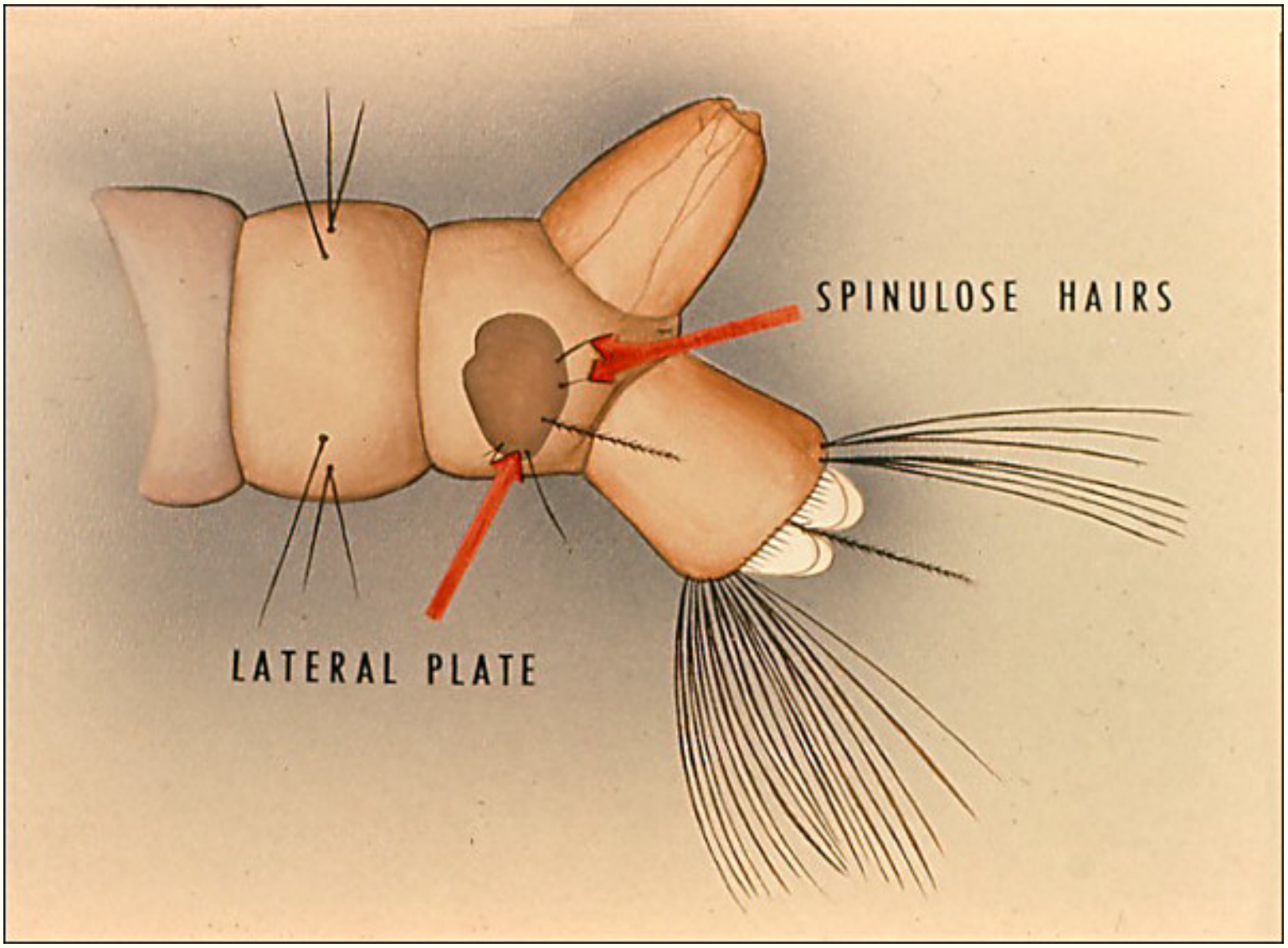

This is the lateral plate. It may bear stout spinulose hairs.

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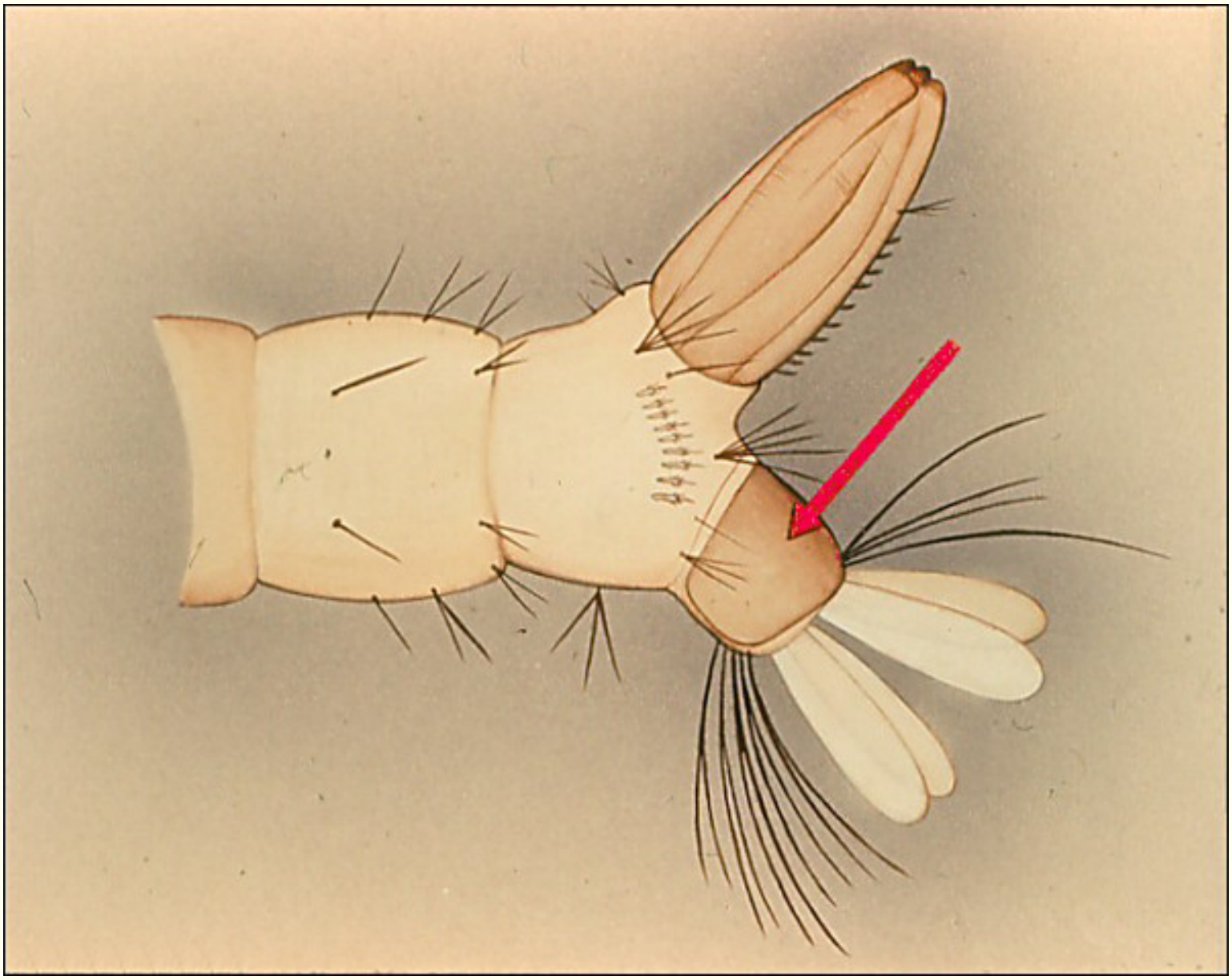

The tenth abdominal segment is more or less covered by a heavily sclerotized plate partially or entirely encircling the segment.

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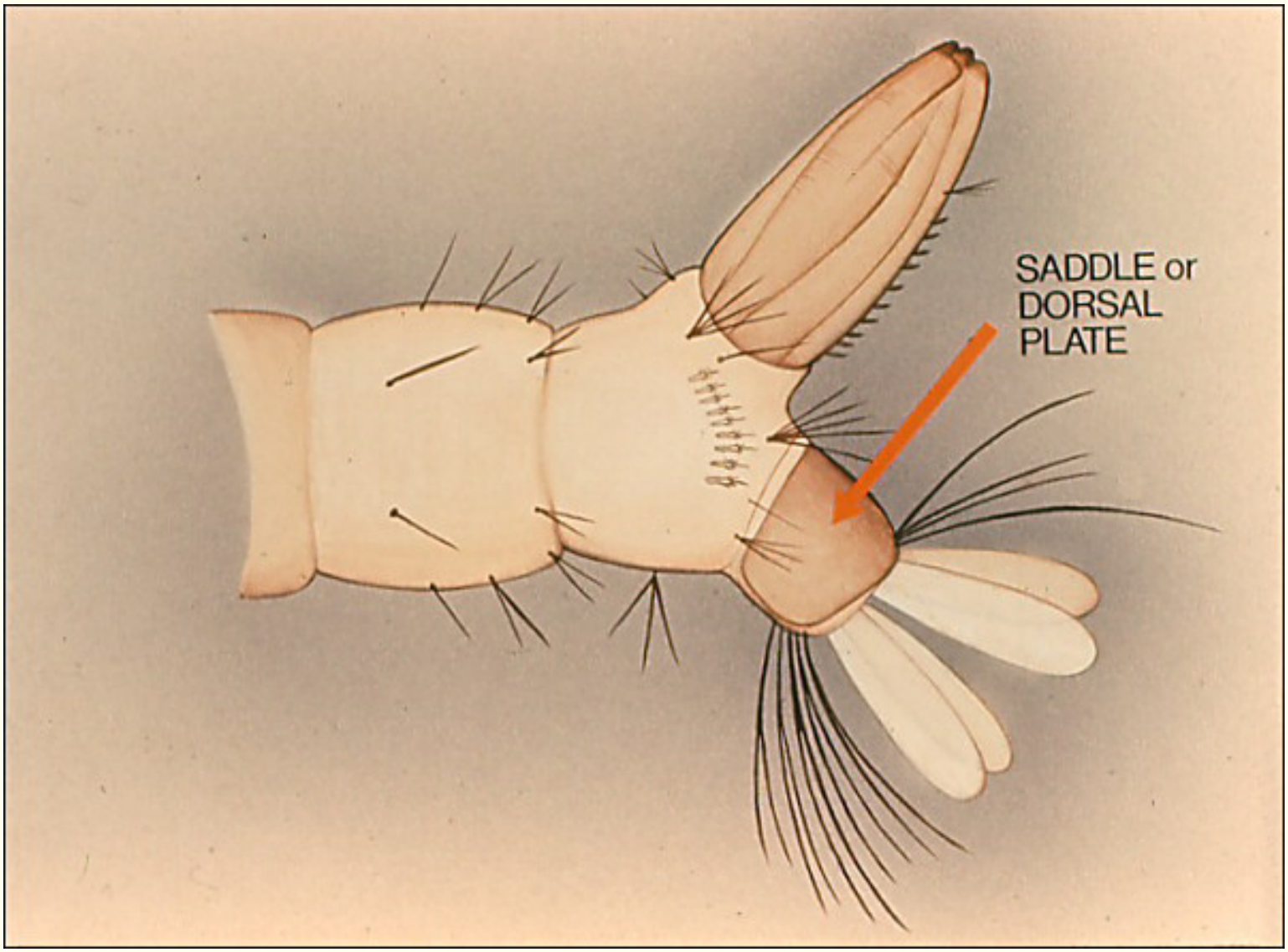

This is the saddle or dorsal plate.

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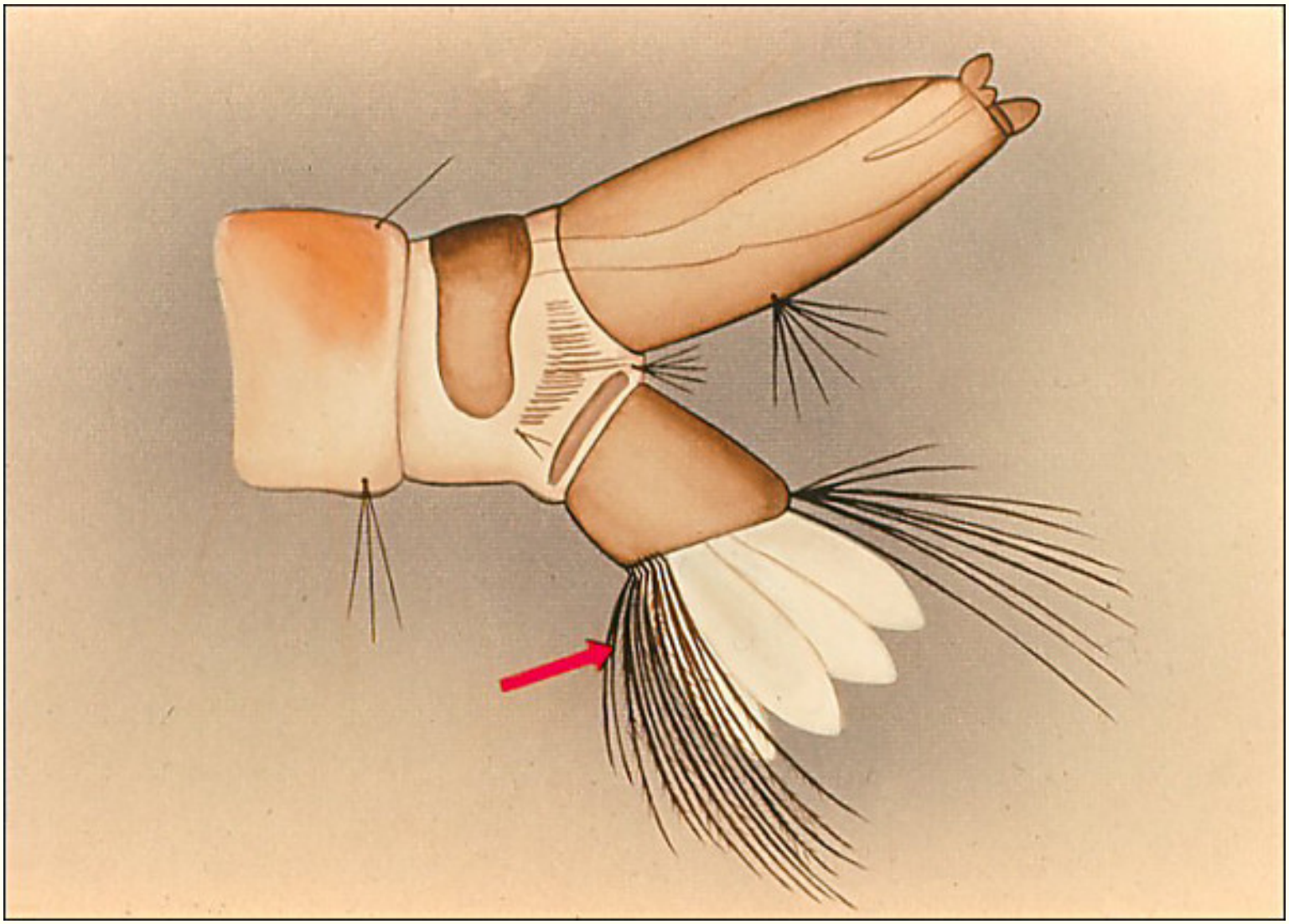

A group of closely set hair tufts forming a brush may also occur on the tenth segment.

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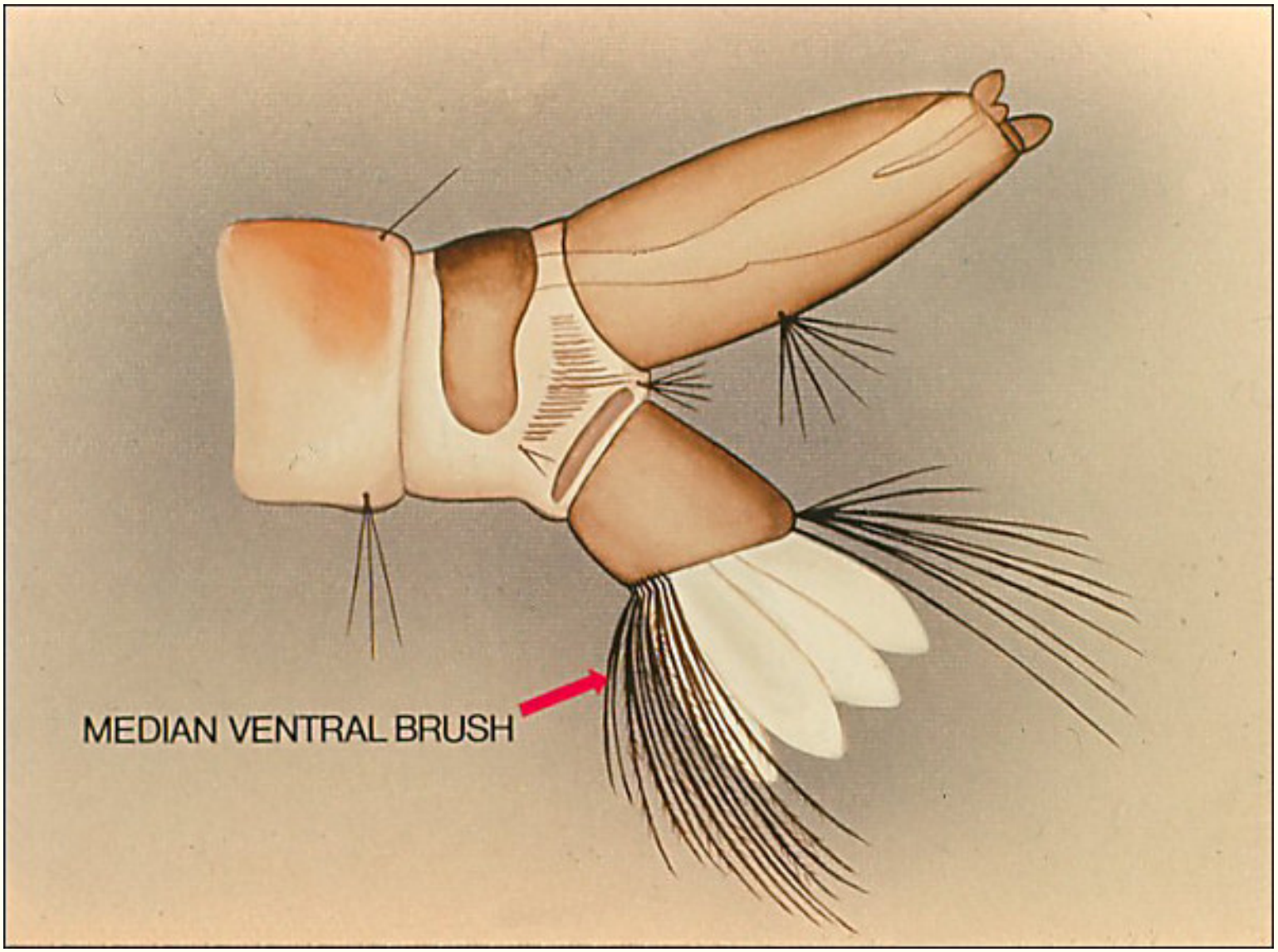

This is the median ventral brush. It may either be partially attached to the saddle or be attached entirely posterior to it.

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The genera which cannot be recognized by a single characteristic may be identified by using a combination of the characters described.

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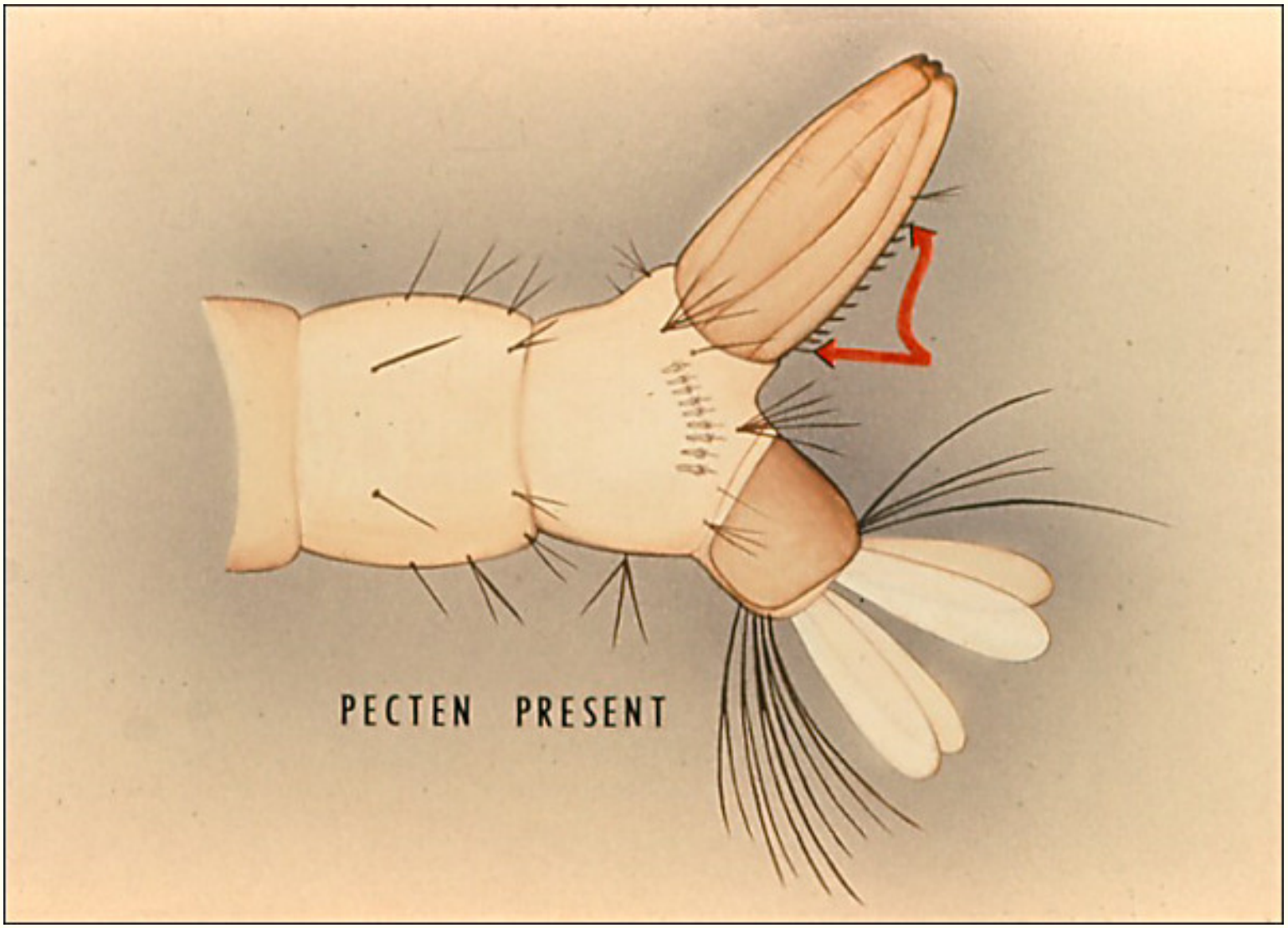

The first step is to determine if a pecten is present . . .

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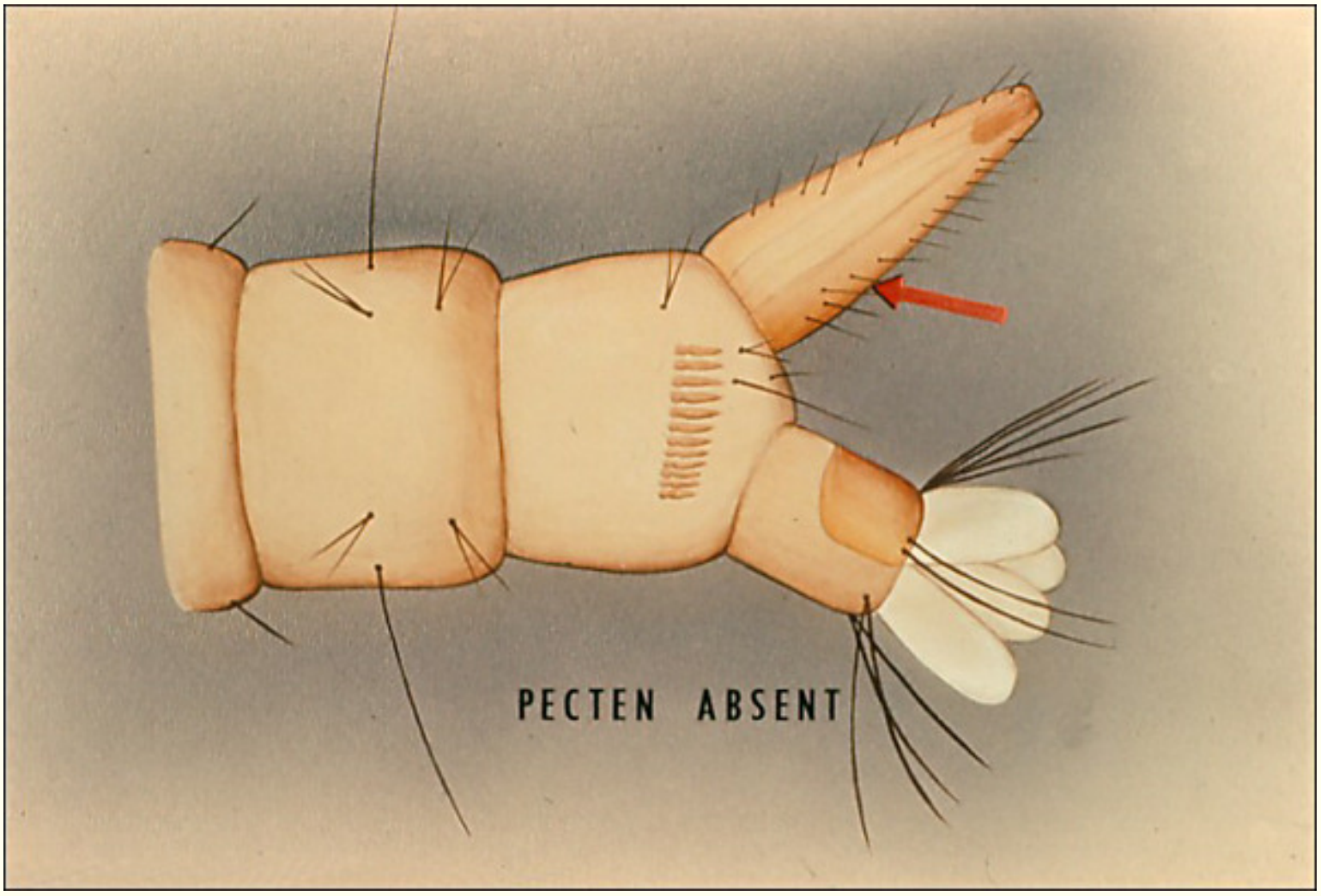

. . . or if the pecten is absent. Do not confuse these hairs on the siphon with the uniform, closely set teeth of the pecten.

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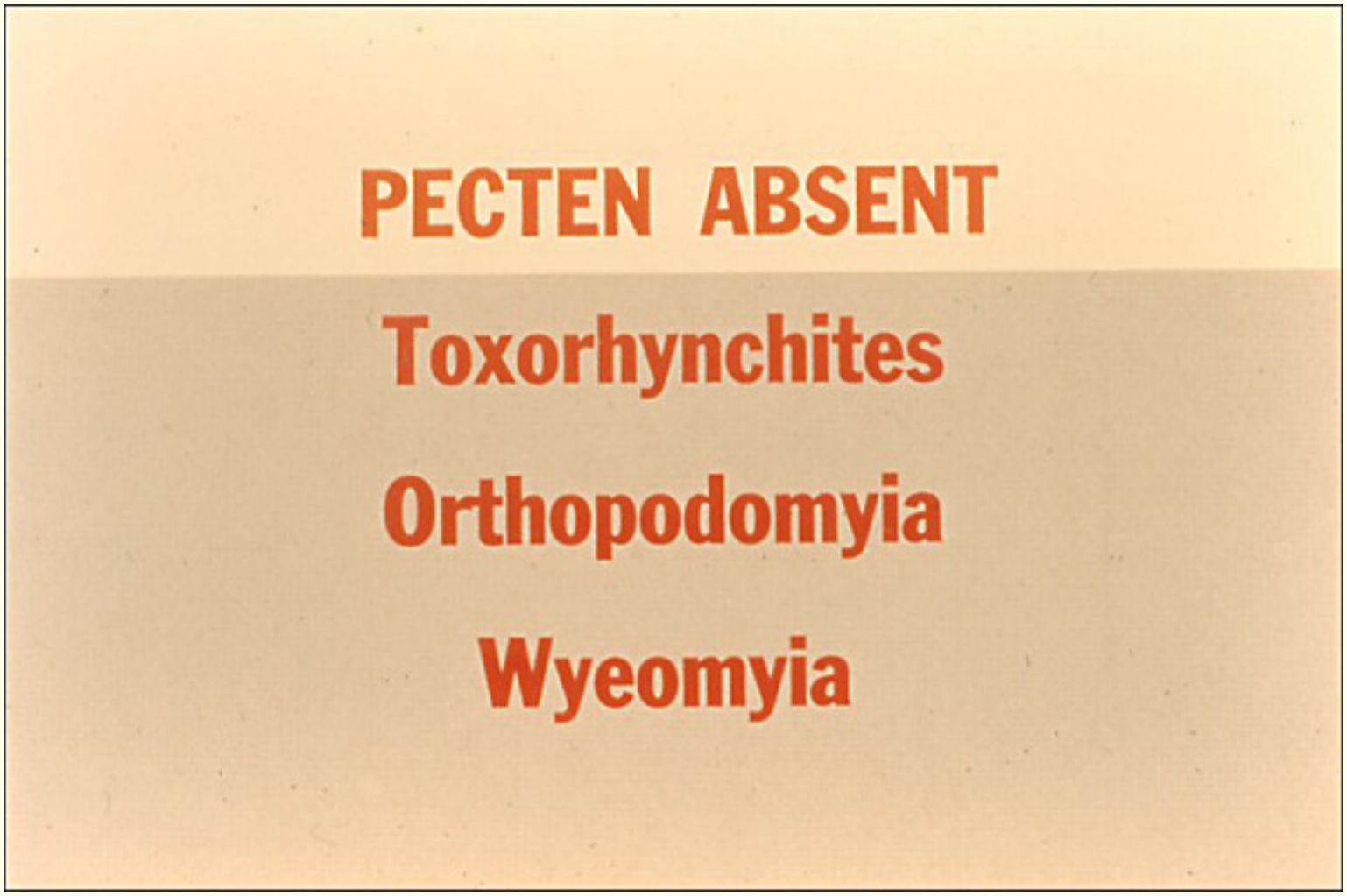

If the pecten is absent, the mosquito belongs to the genus *Toxorhynchites, Orthopodomyia*, or *Wyeomyia*.

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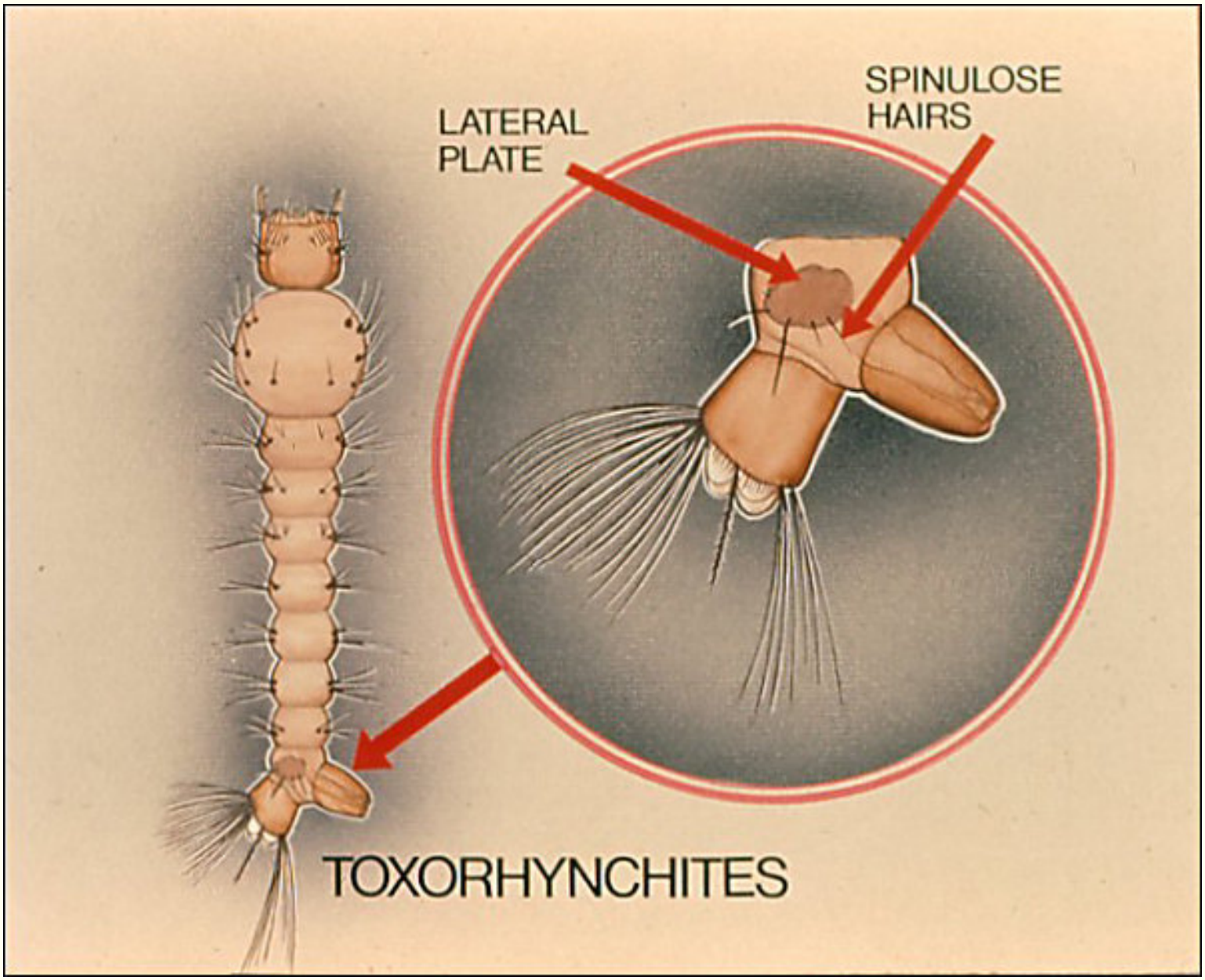

Toxorhynchites is distinguished readily by the presence of the lateral plate bearing spinulose hairs. Note that comb scales are not present.

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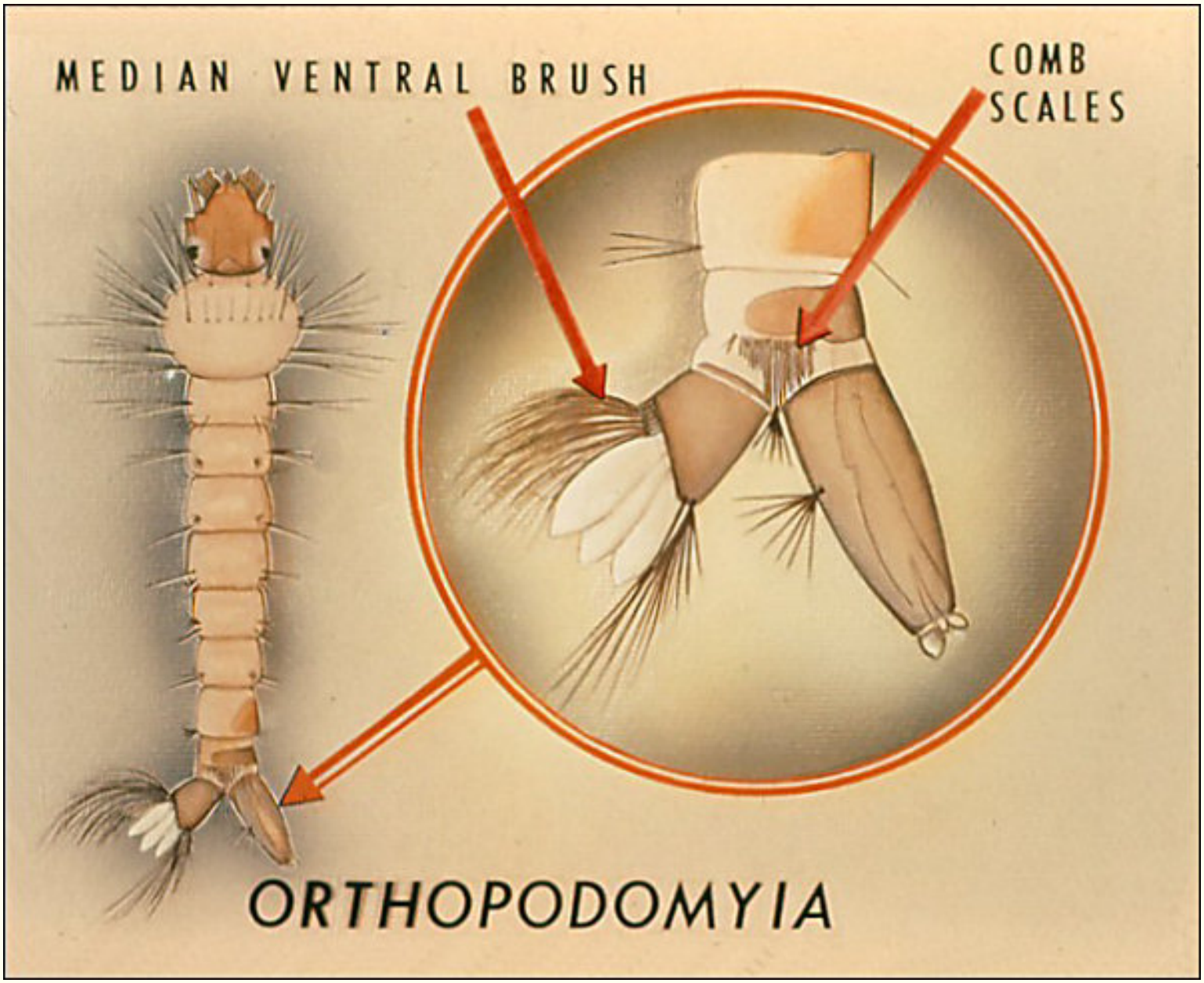

Orthopodomyia has comb scales present. This genus may be distinguished from *Wyeomyia* by the closely set tufts of hairs on the

ventral side of the tenth abdominal segment which form the median ventral brush.

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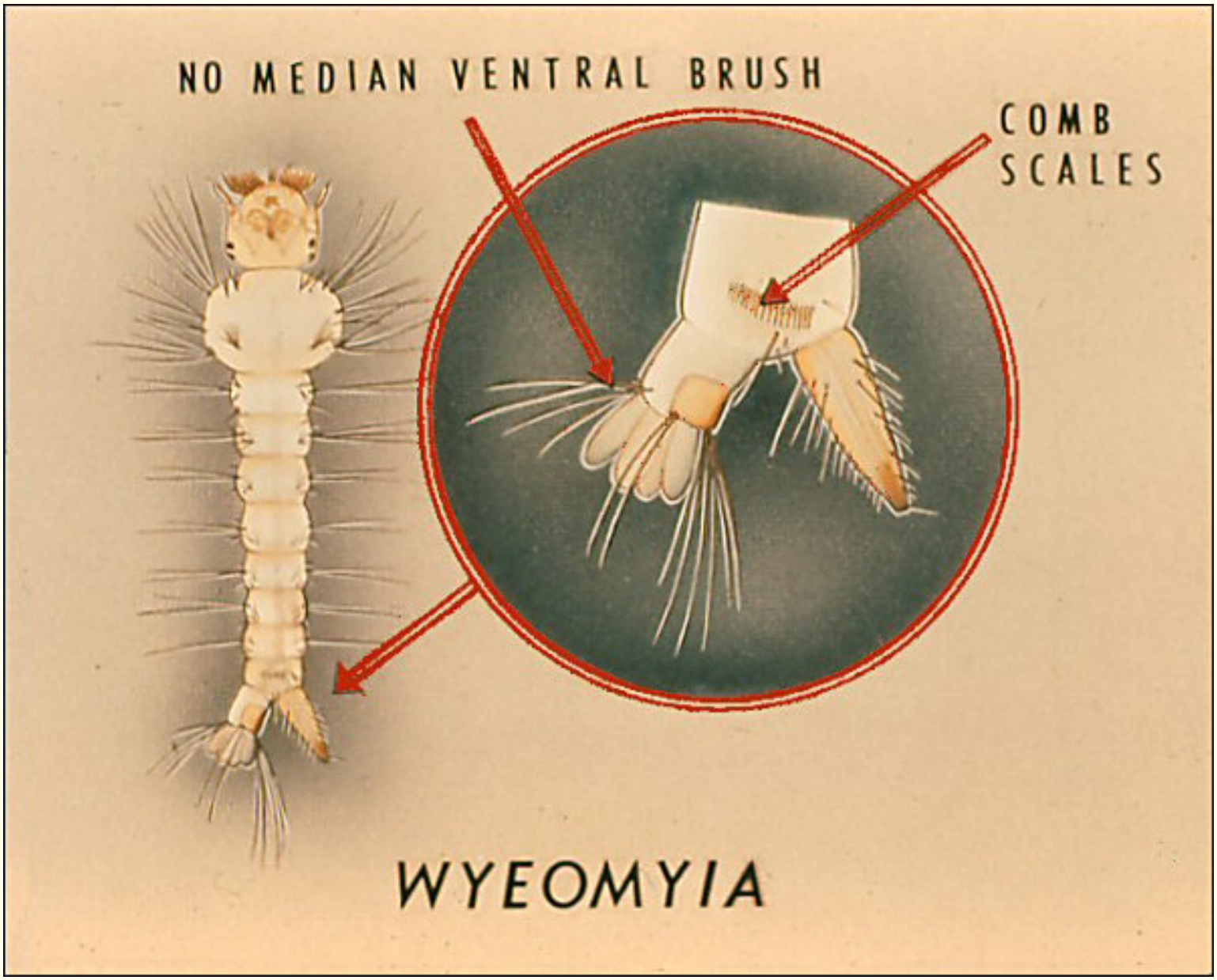

Wyeomyia has comb scales like *Orthopodomyia*, but the median ventral brush is lacking. Members of this genus breed in water held

by the leaves of plants.

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If a pecten is present, the mosquito belongs to the genus *Uranotaenia, Deinocerites, Psorophora, Aedes, Culiseta*, or *Culex*. Members of some of these genera may have as few as three or four pecten teeth.

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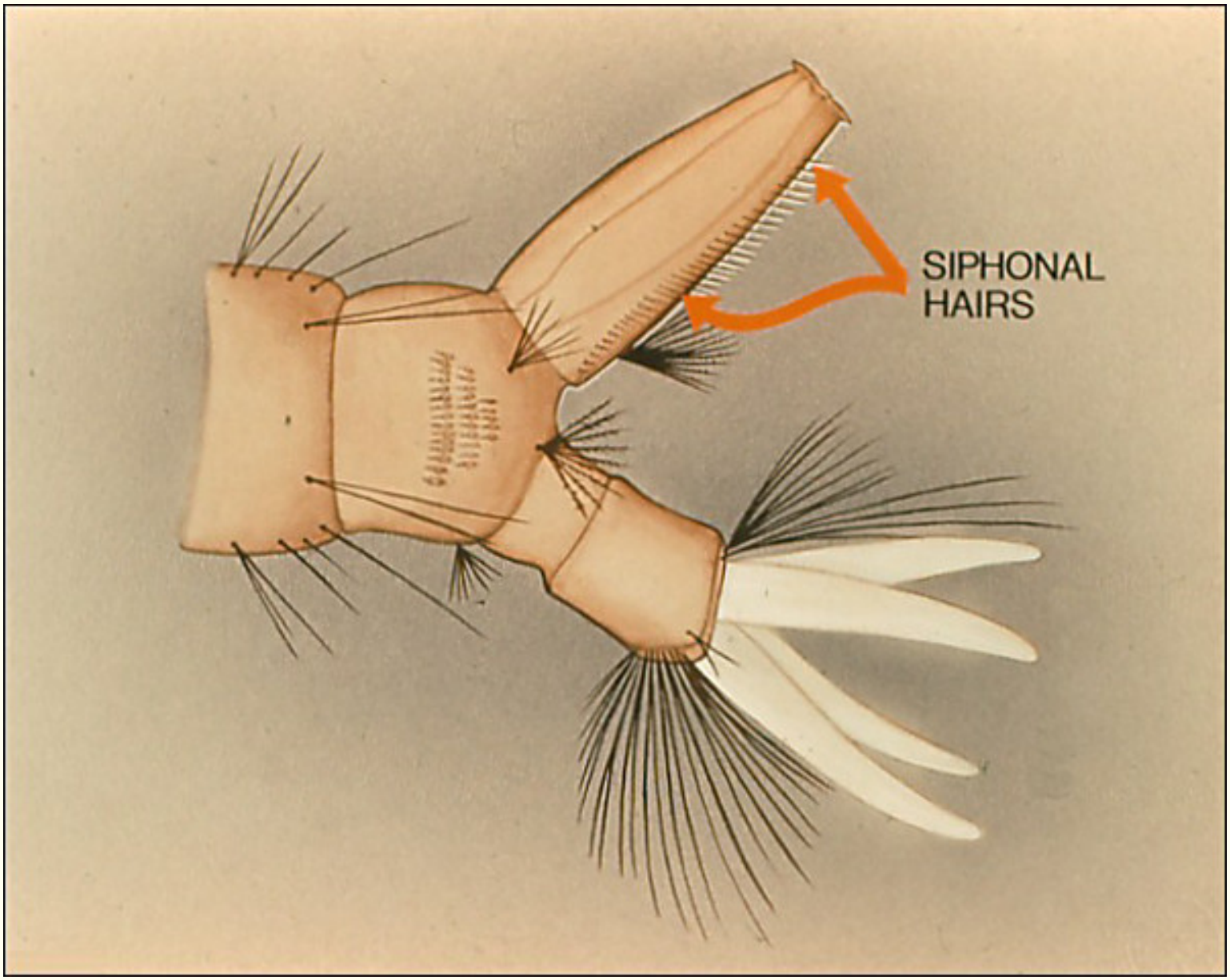

These genera may be subdivided on the basis of the number of pairs of hairs or tufts of hairs actually attached to the siphon.

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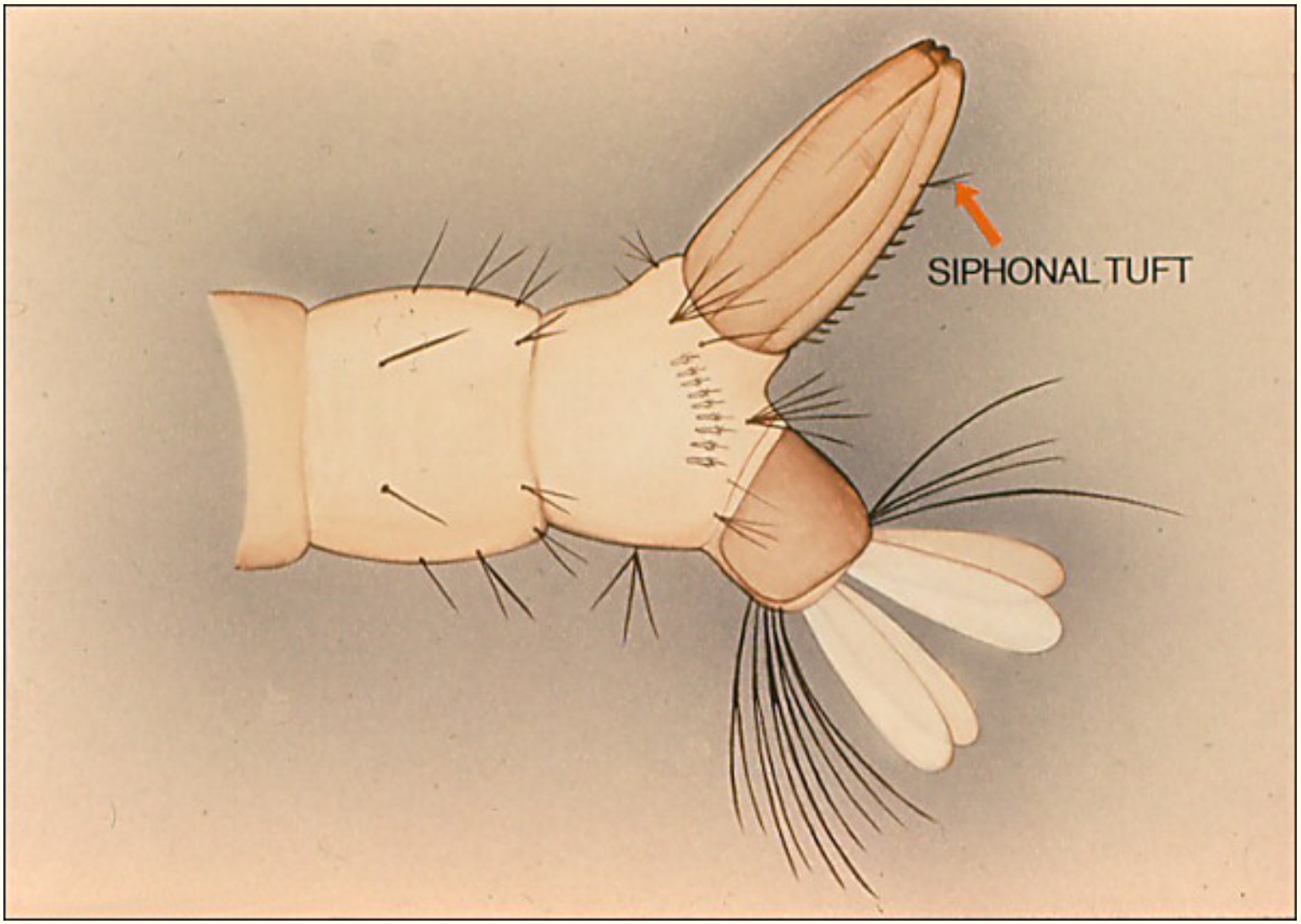

If only one pair of siphonal tufts or hairs is present, the specimen is a member of the genus *Uranotaenia, Psorophora*, or *Aedes*.

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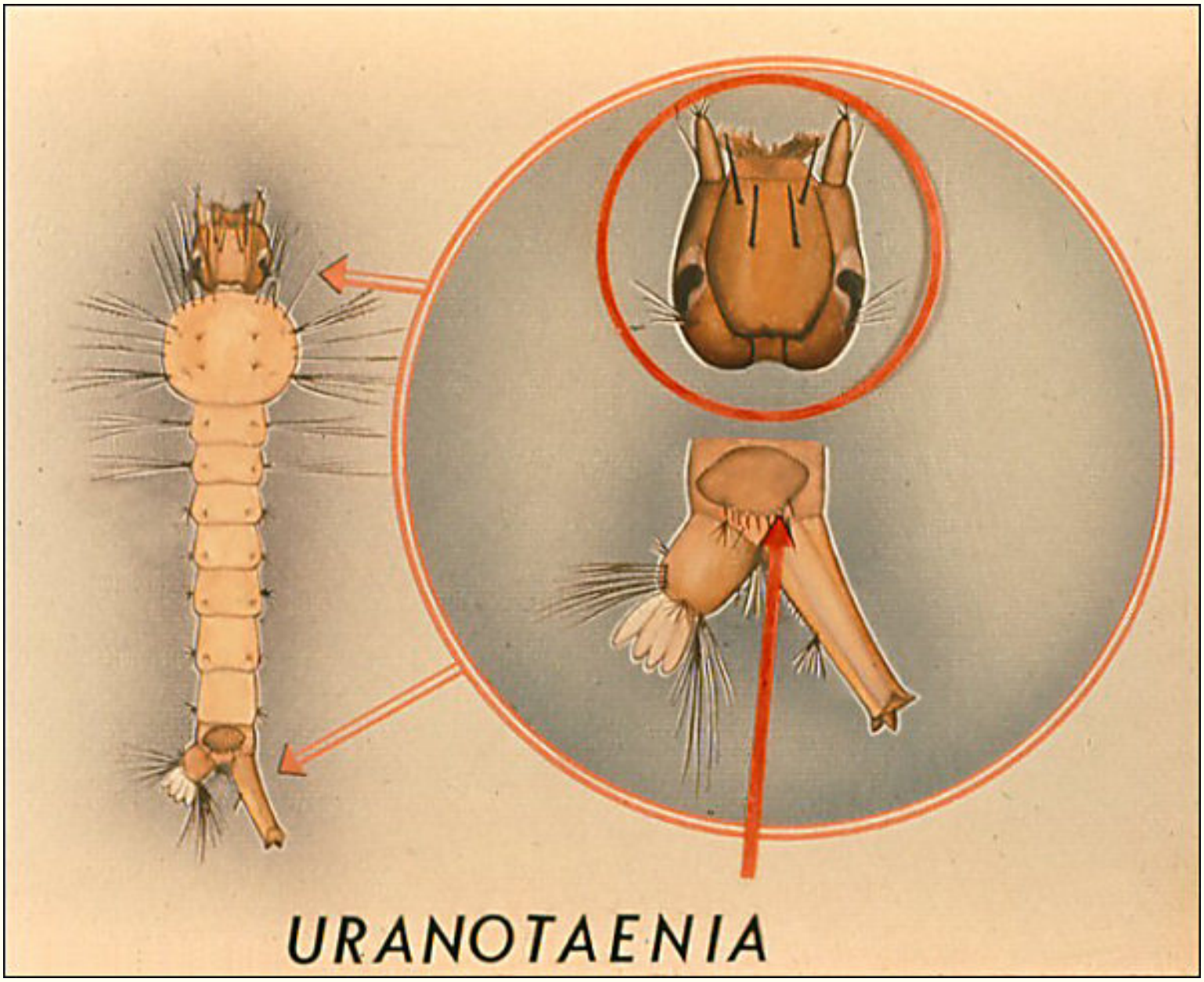

If a row of teeth arises from a large sclerotized plate borne laterally on the eighth abdominal segment, the genus is *Uranotaenia*.

Members of this genus have characteristically shaped heads, longer than wide. All but one Western species have four stout spines on the head.

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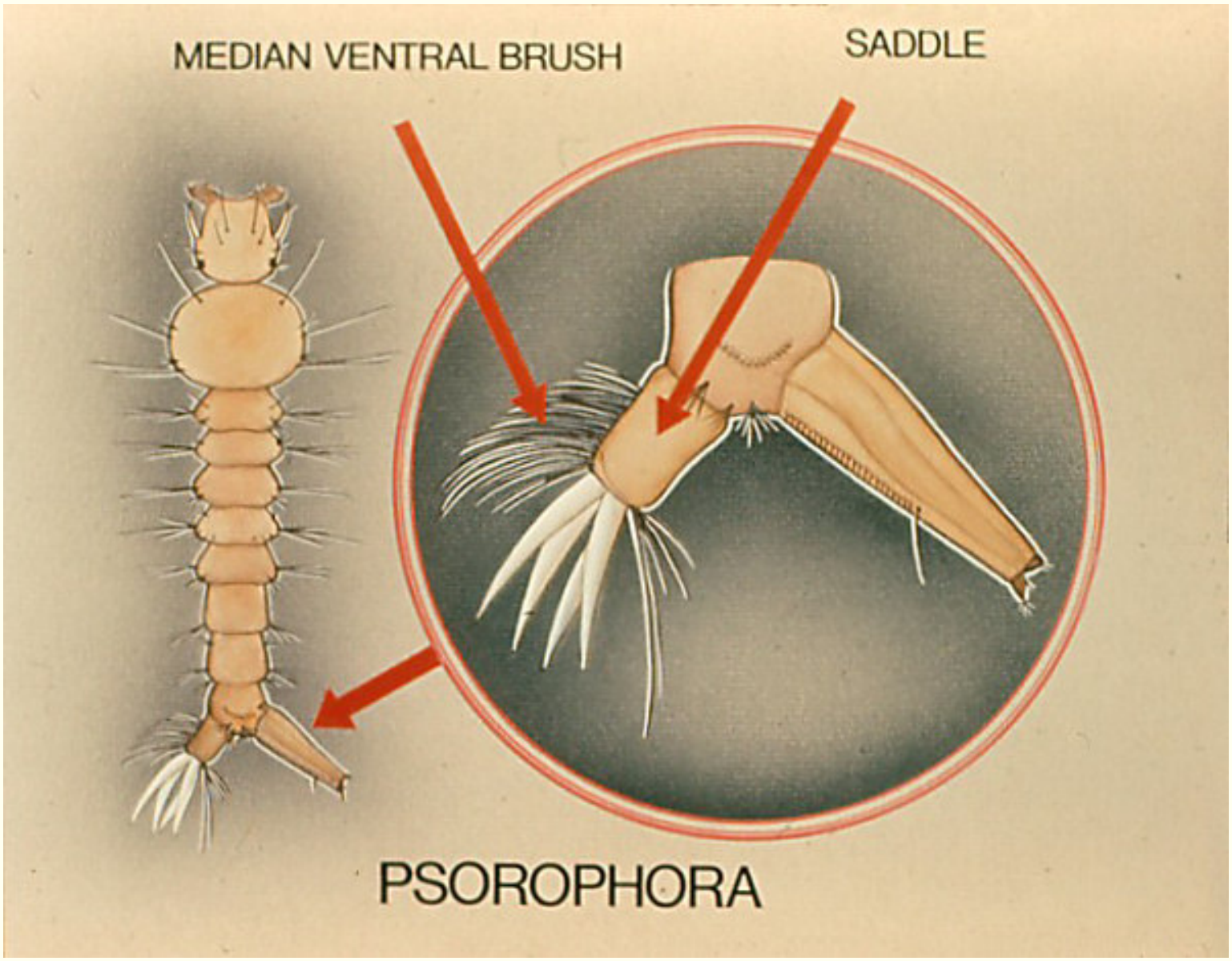

If some of the tufts of the median ventral brush are attached to the saddle which encircles the tenth abdominal segment completely, the genus is *Psorophora*.

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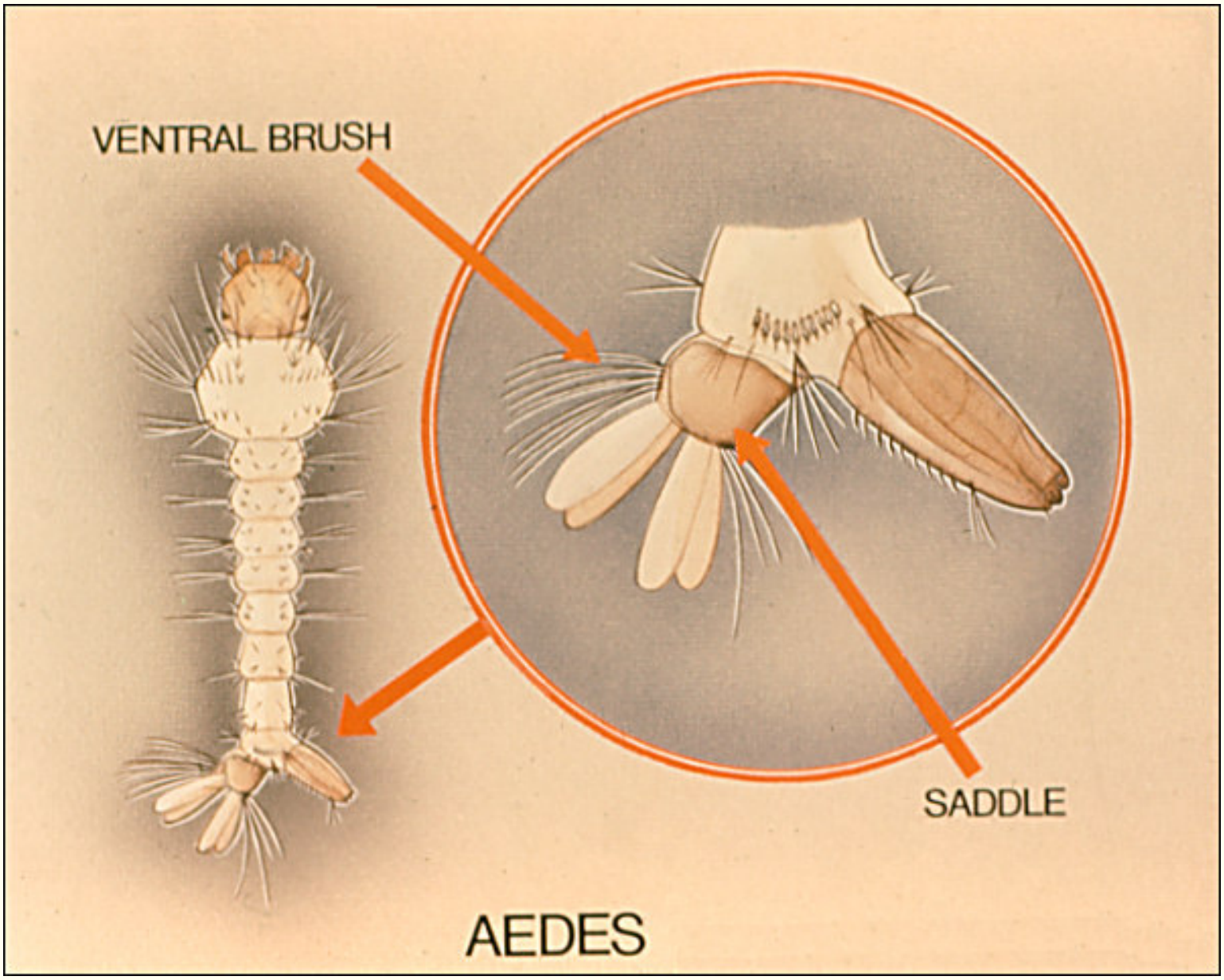

If the ventral brush is attached posteriorly to the saddle plate, or if the saddle does not encircle the anal segment completely, the genus

is *Aedes*. In most species, the saddle plate does not completely encircle the anal segment, but in those cases where it does, the ventral brush is attached posteriorly to it and none of the tufts are actually borne on the saddle plate.

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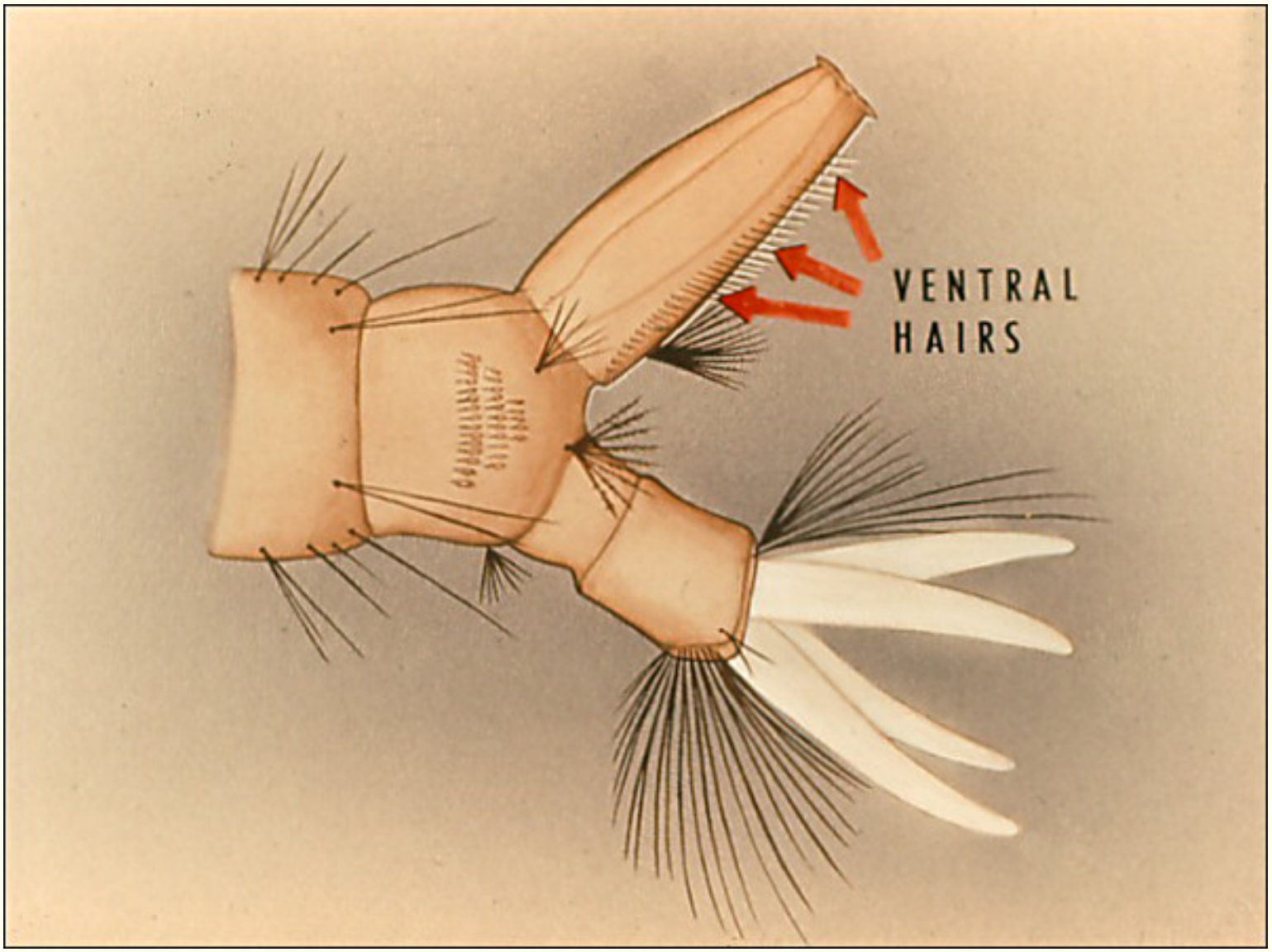

If several pairs of tufts or single hairs occur on the siphon, the mosquito is a member of either the genus *Deinocerites, Culiseta*, or *Culex*.

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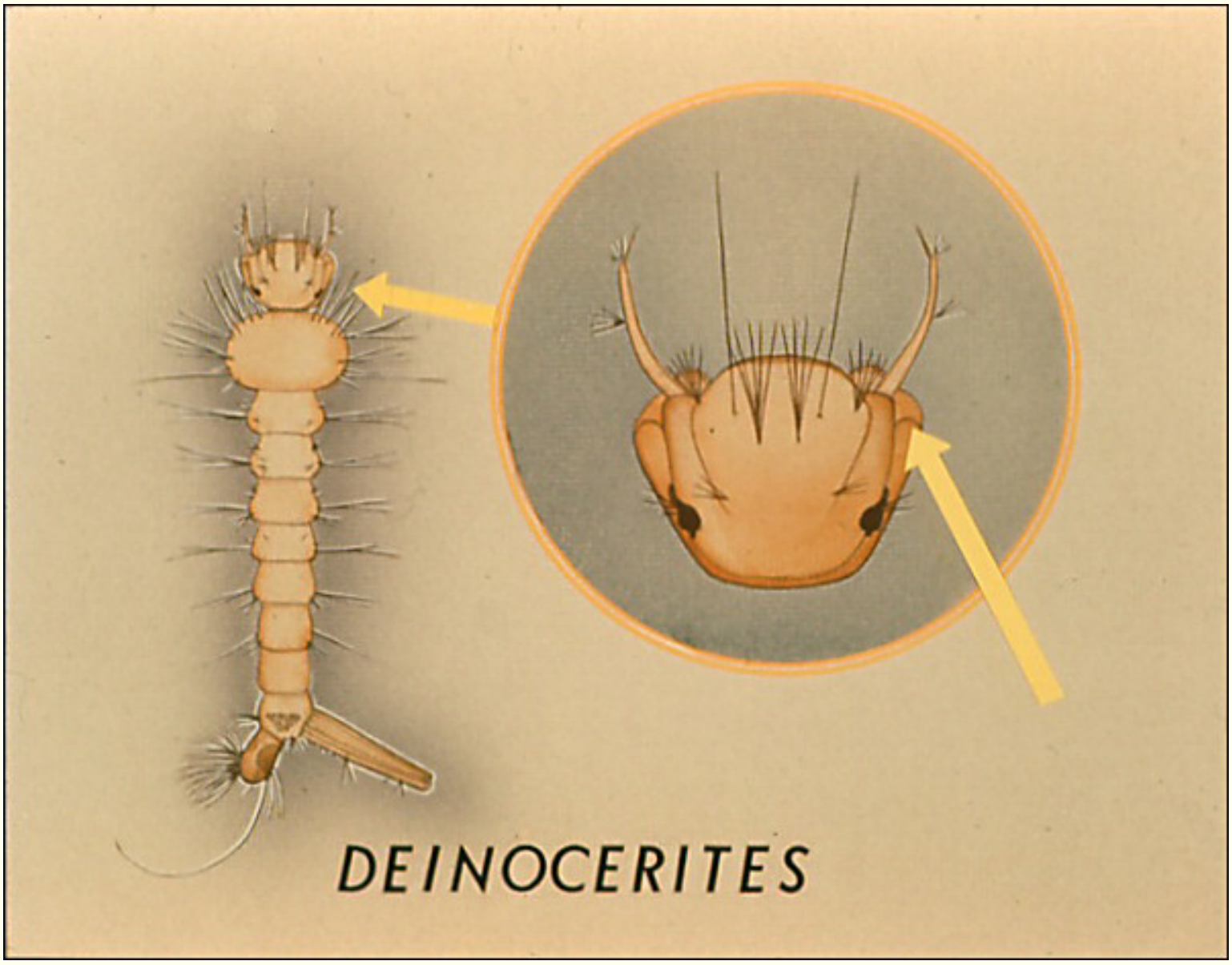

Deinocerites has characteristic pouches on the sides of the head. They also have two plates on the anal segment, a dorsal plate, and a ventral plate. Members of this genus breed only in crab holes.

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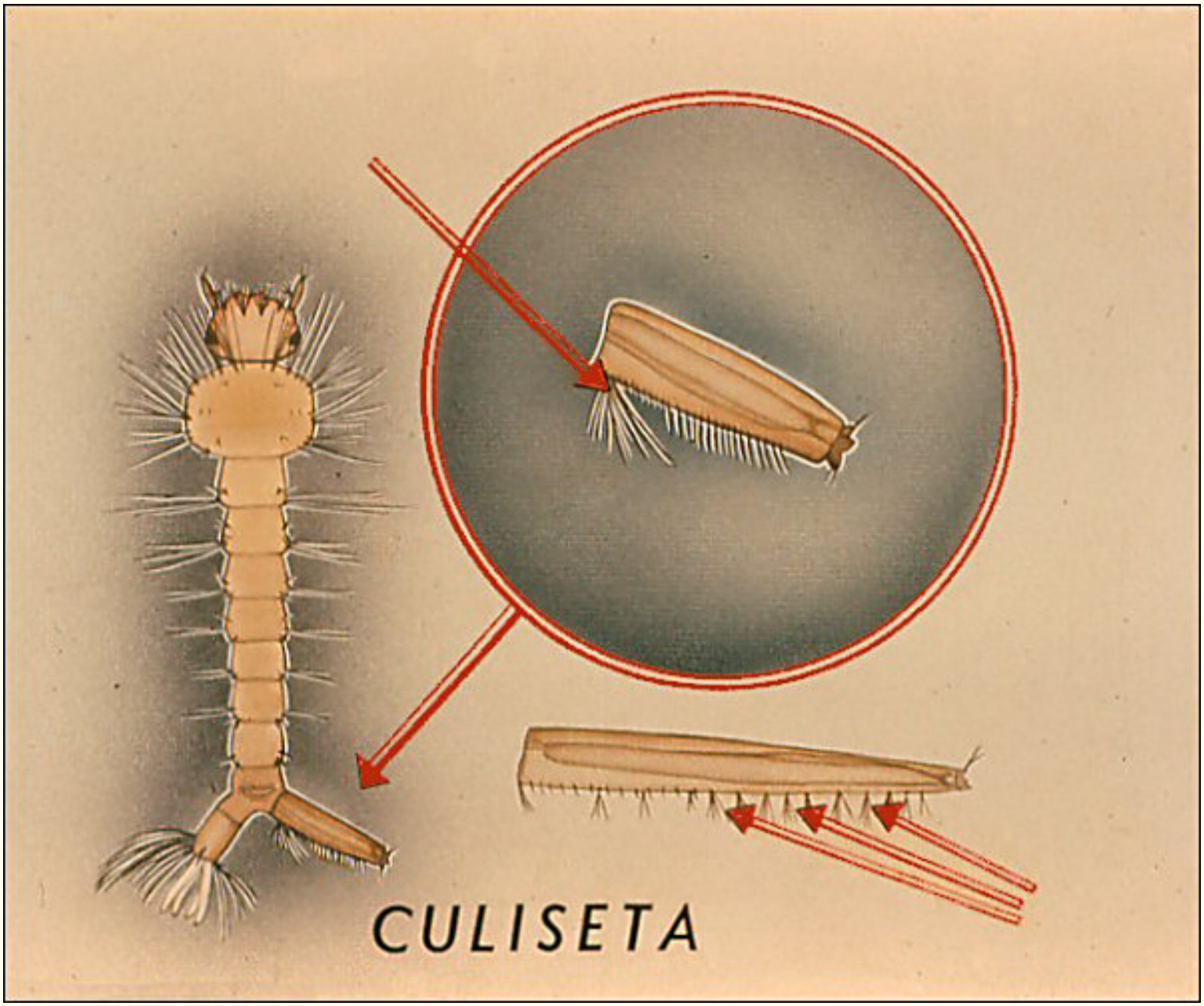

If there is a pair of tufts near the base of the siphon, and a ventral

row of tufts, or a row of straight hairs following the pecten, or no additional hairs or tufts, the genus is *Culiseta*.

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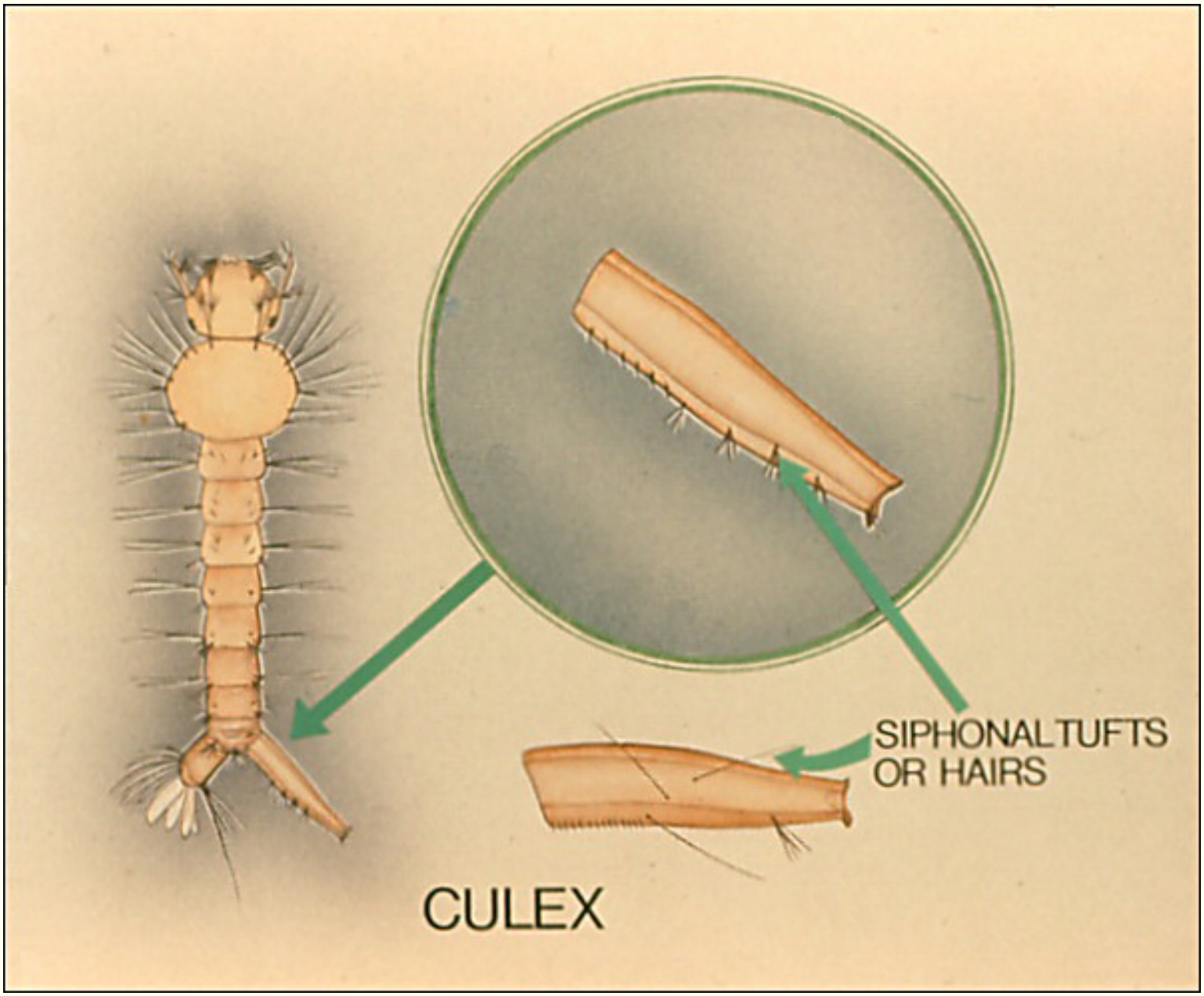

If a basal tuft is. not present, the genus is *Culex*: A row of tufts or

scattered hairs occurs along each side of the siphon.

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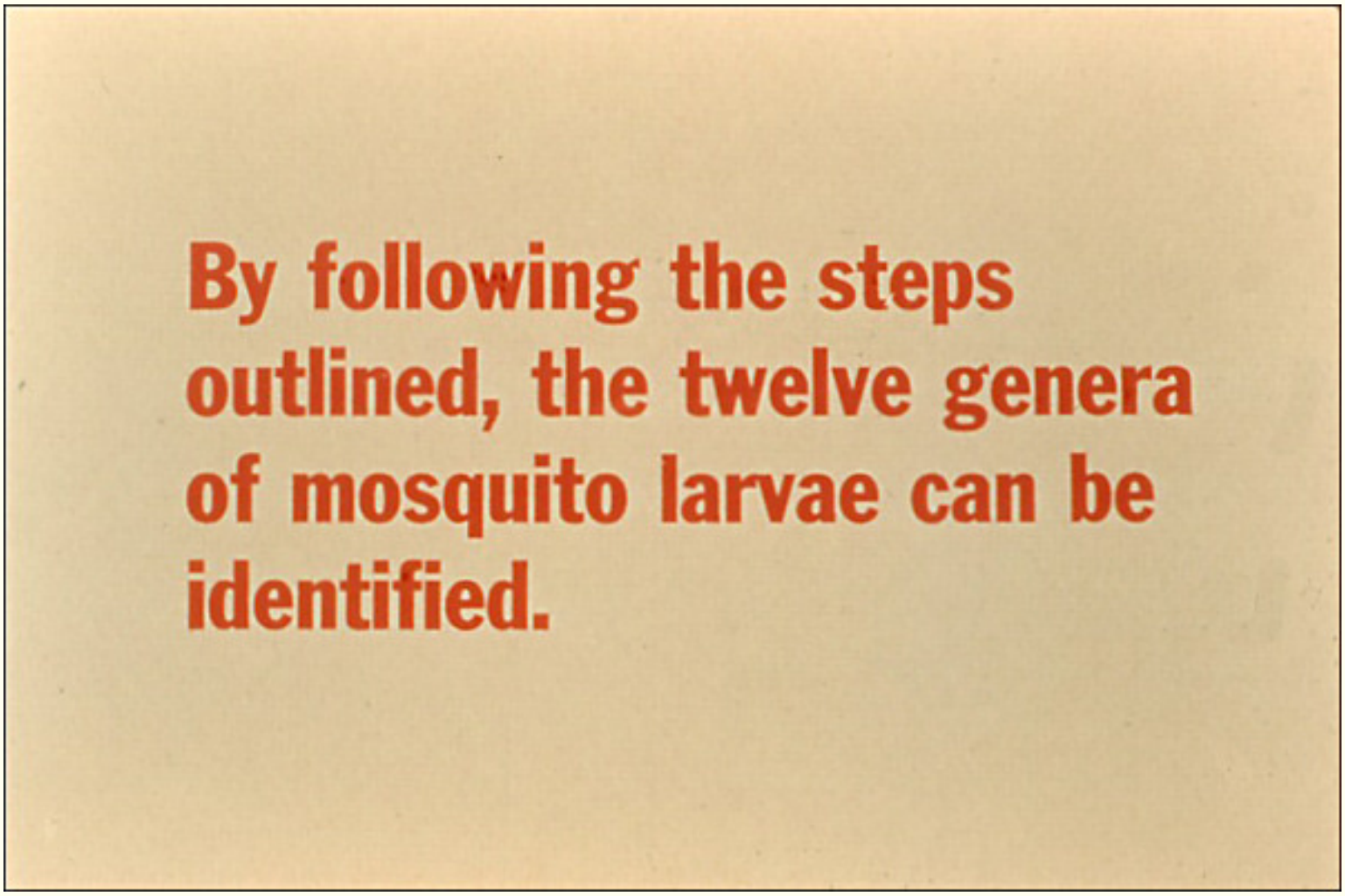

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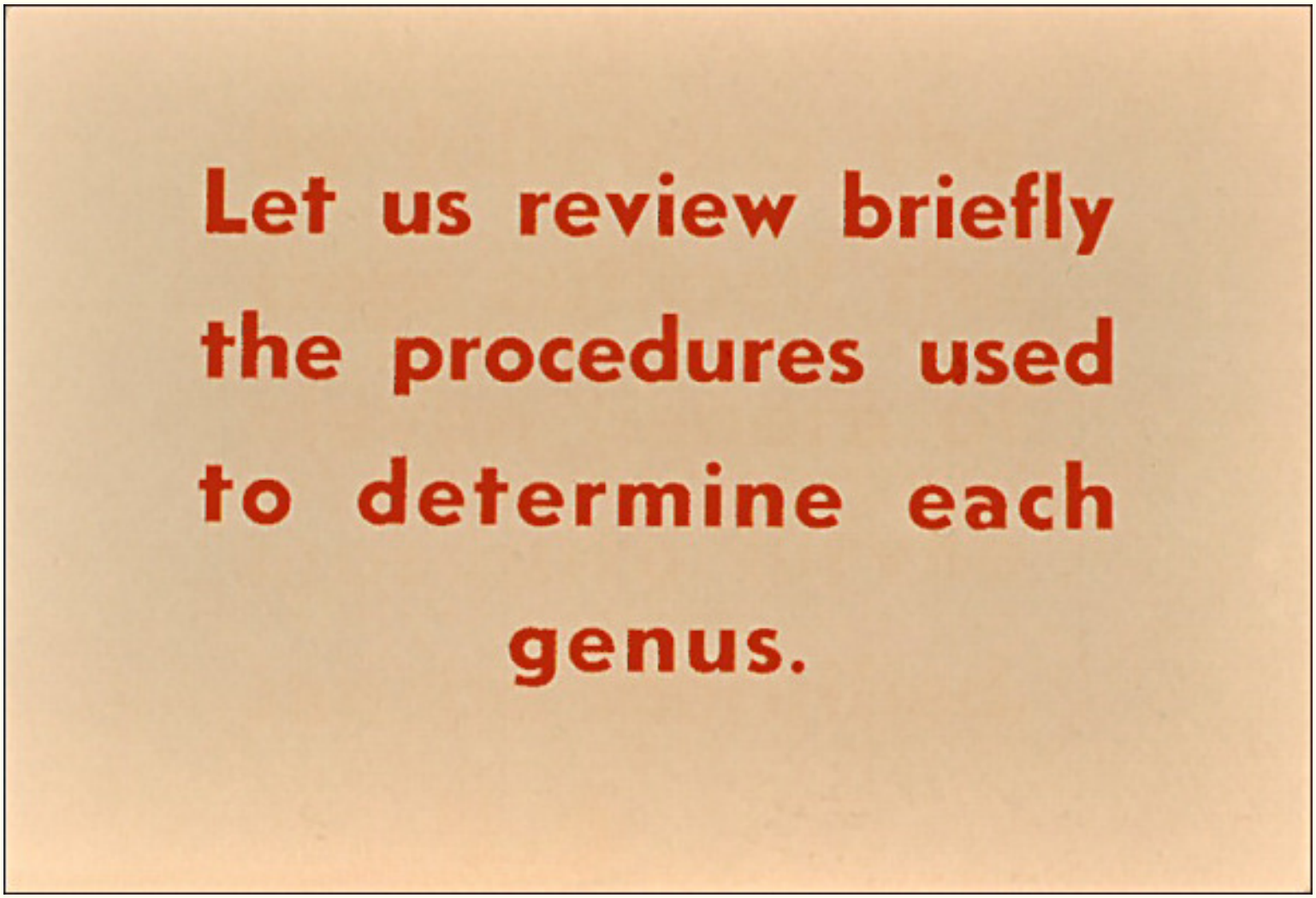

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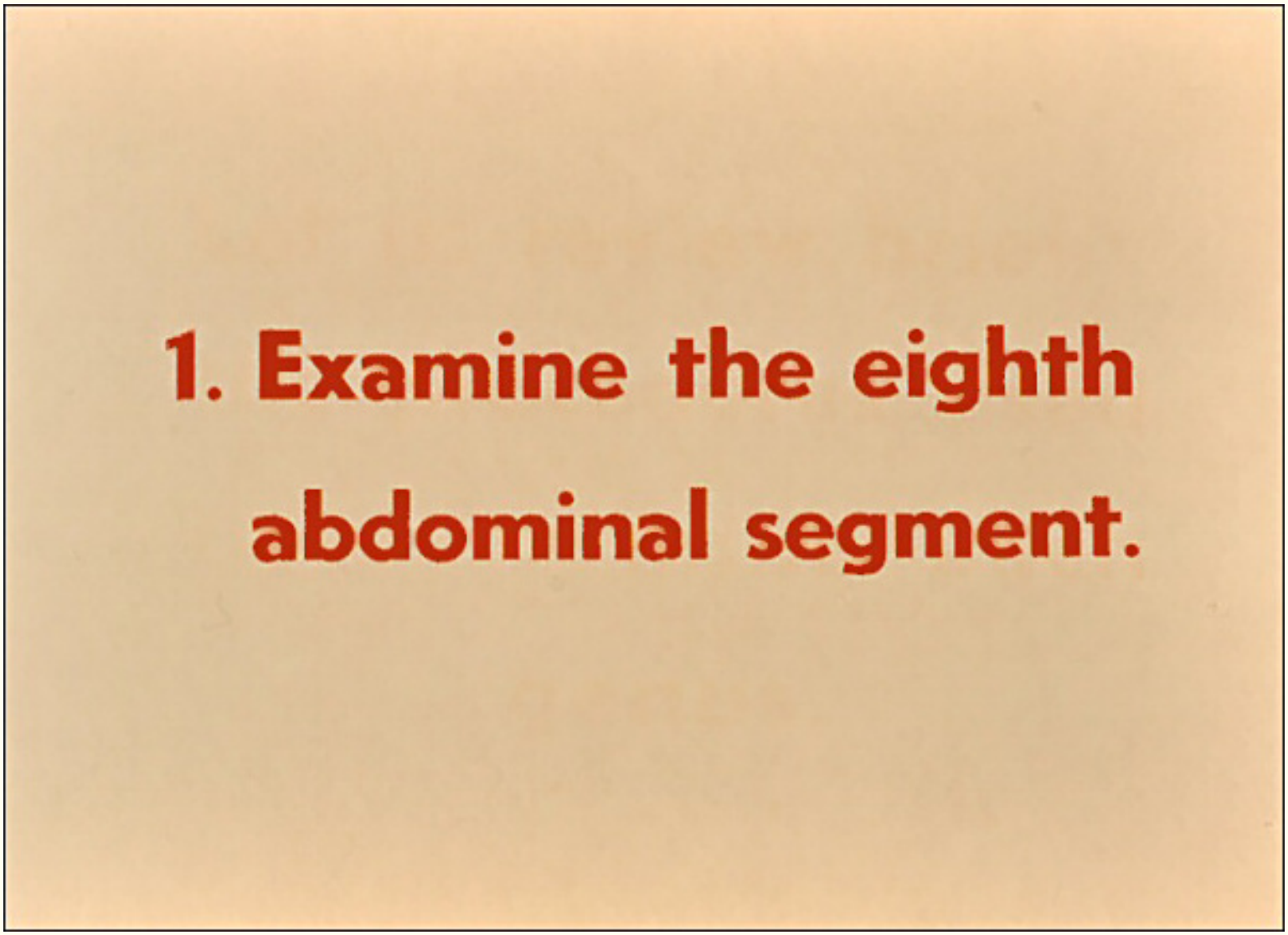

First, examine the eighth abdominal segment for the presence or absence of a siphon.

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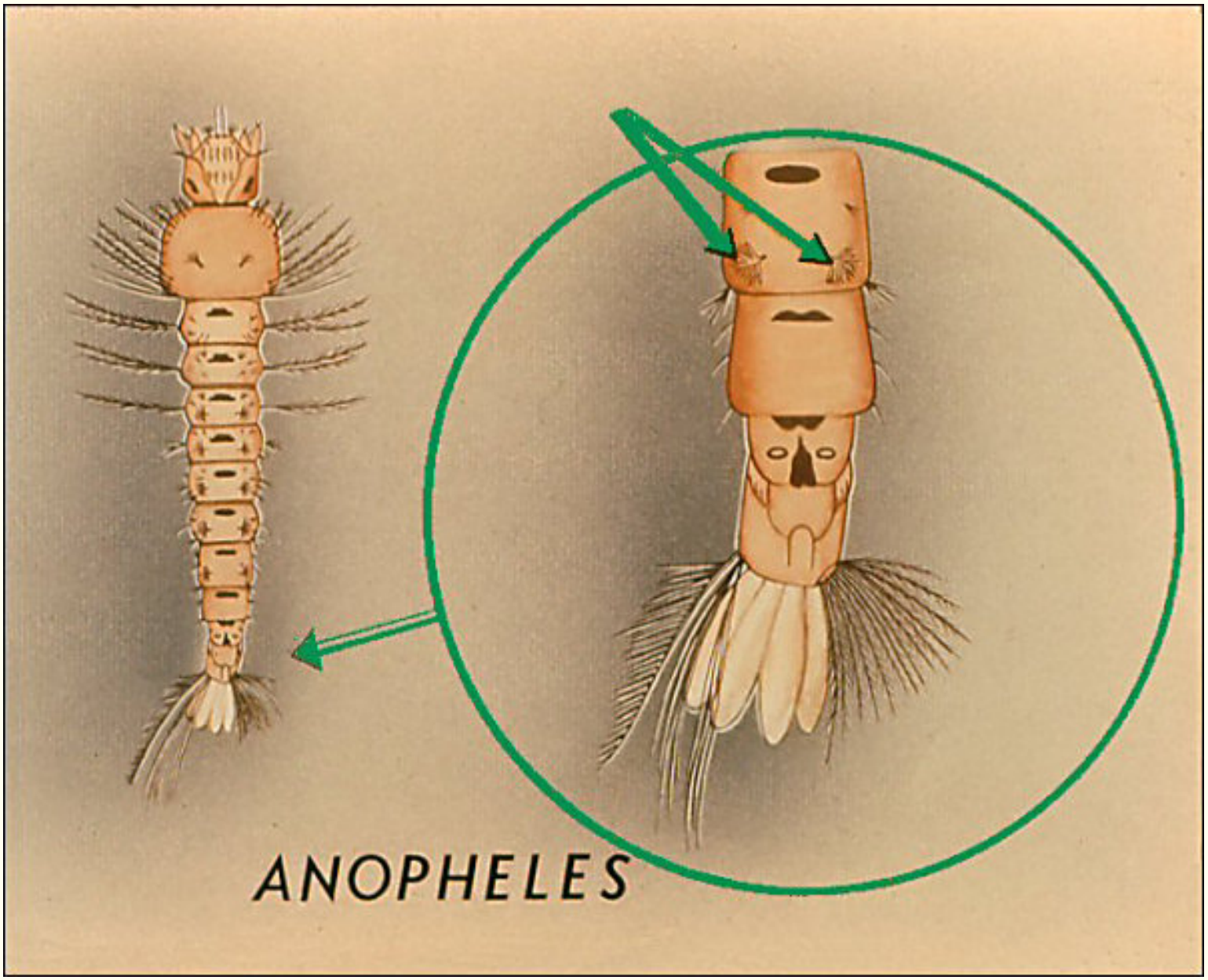

If it is absent, the mosquito belongs to the genus *Anopheles*. The palmate hairs are also characteristic.

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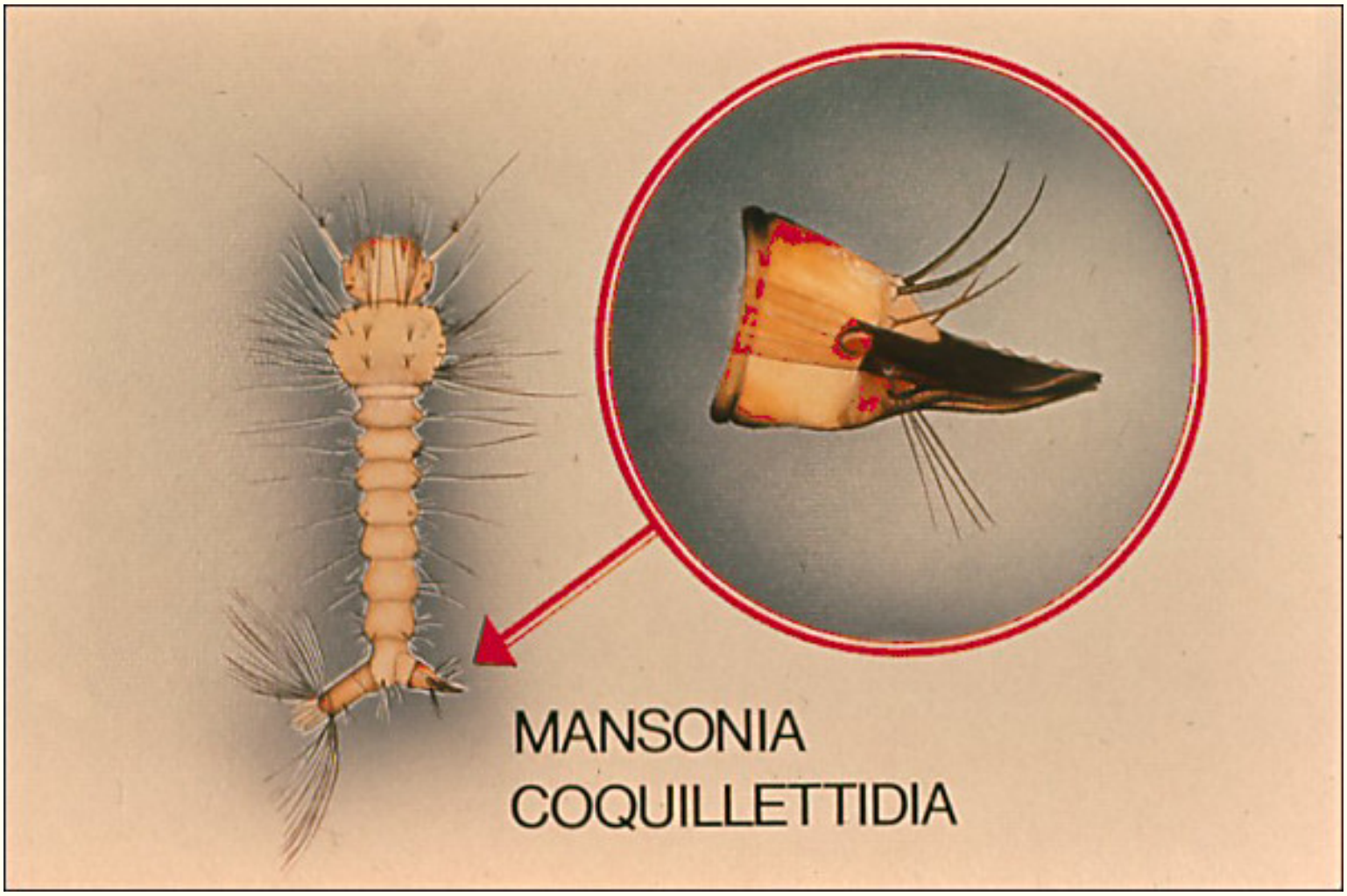

If the siphon is present and characteristically modified for piercing plant tissue, the genus is either *Mansonia* or *Coquillettidia*.

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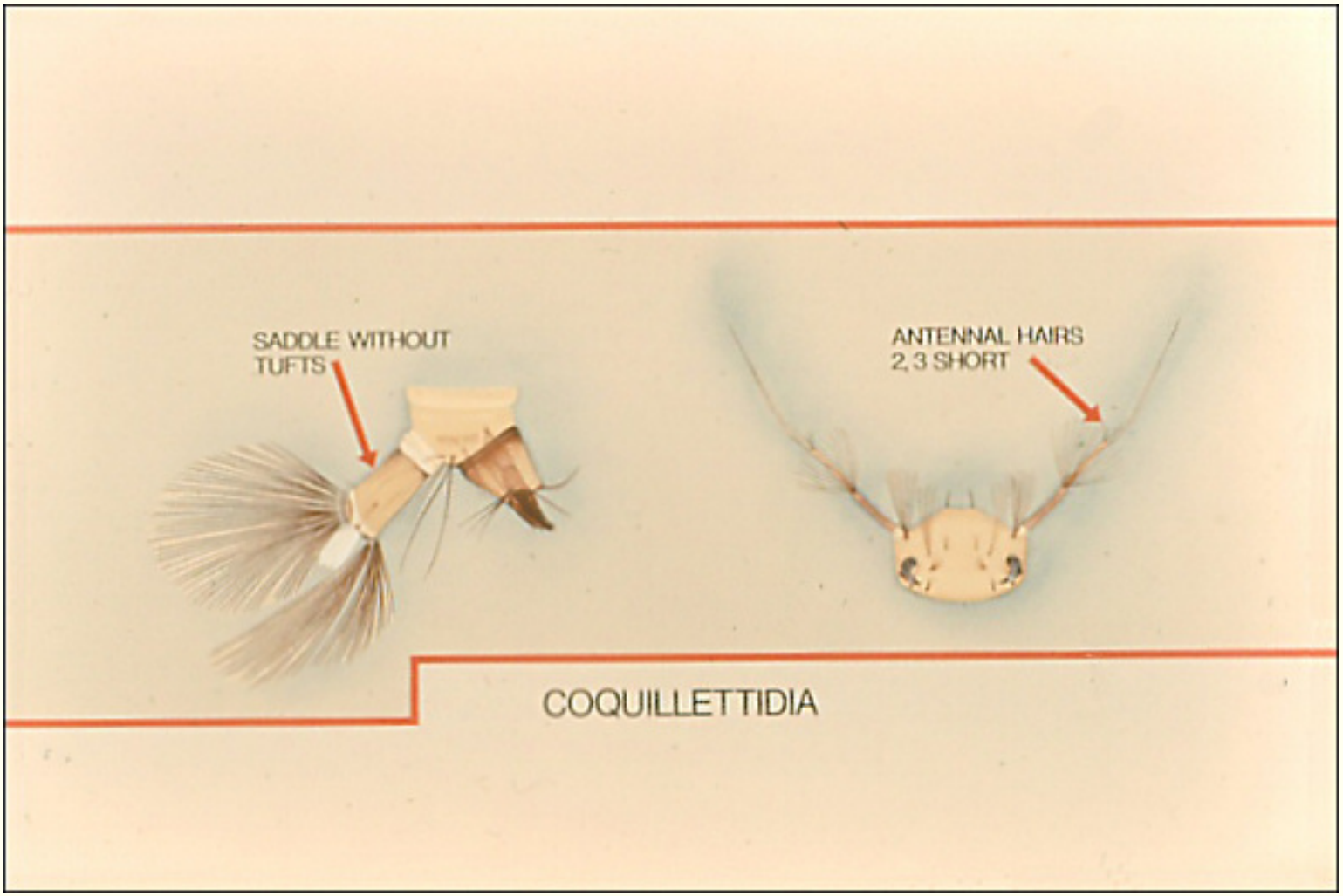

If the siphon is present and characteristically modified for piercing plant tissue, the genus is either *Mansonia* or *Coquillettidia*.

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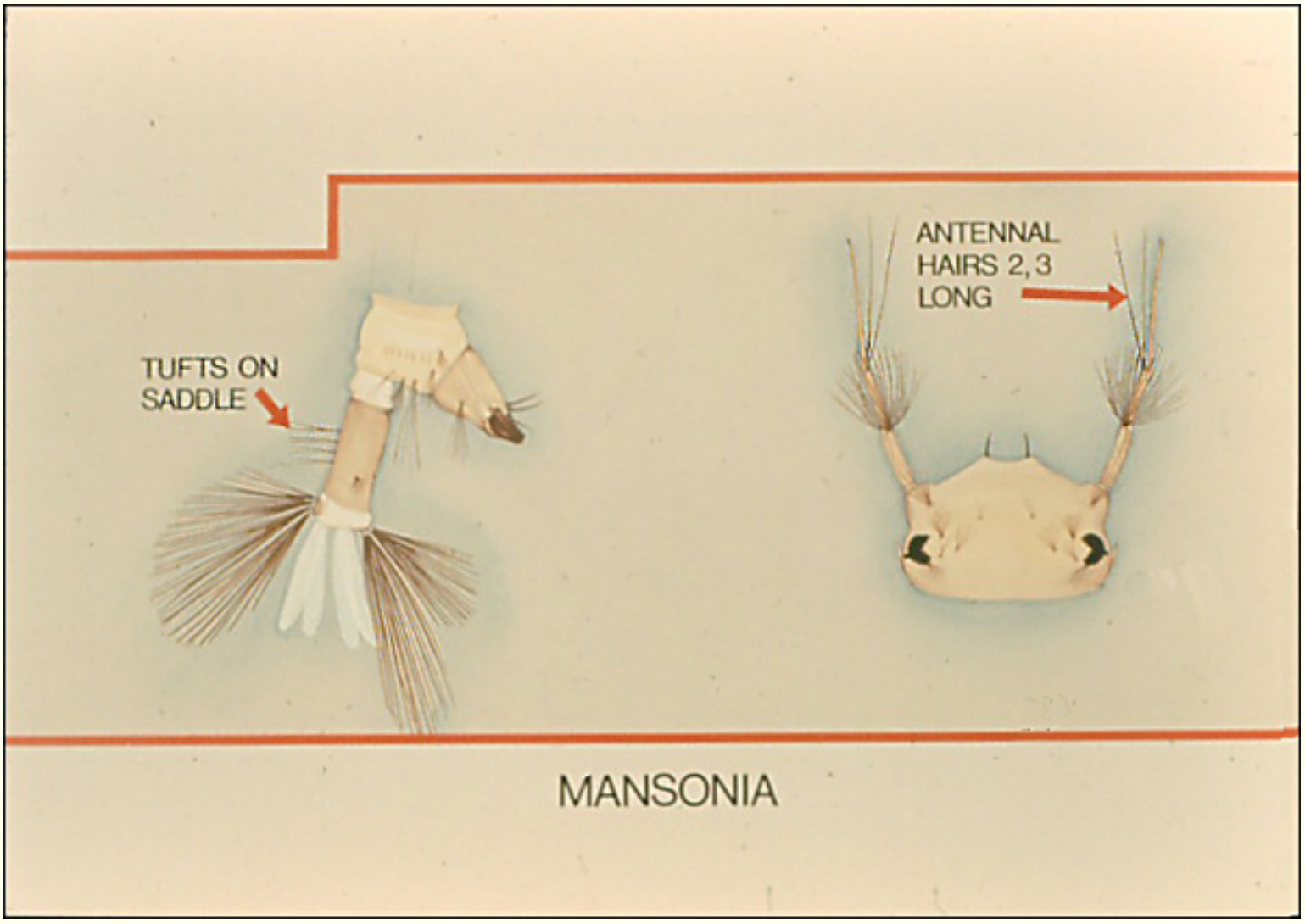

Whereas in *Mansonia*, four prominent hairs are present on the saddle, and antennal hairs 2 and 3 are very long.

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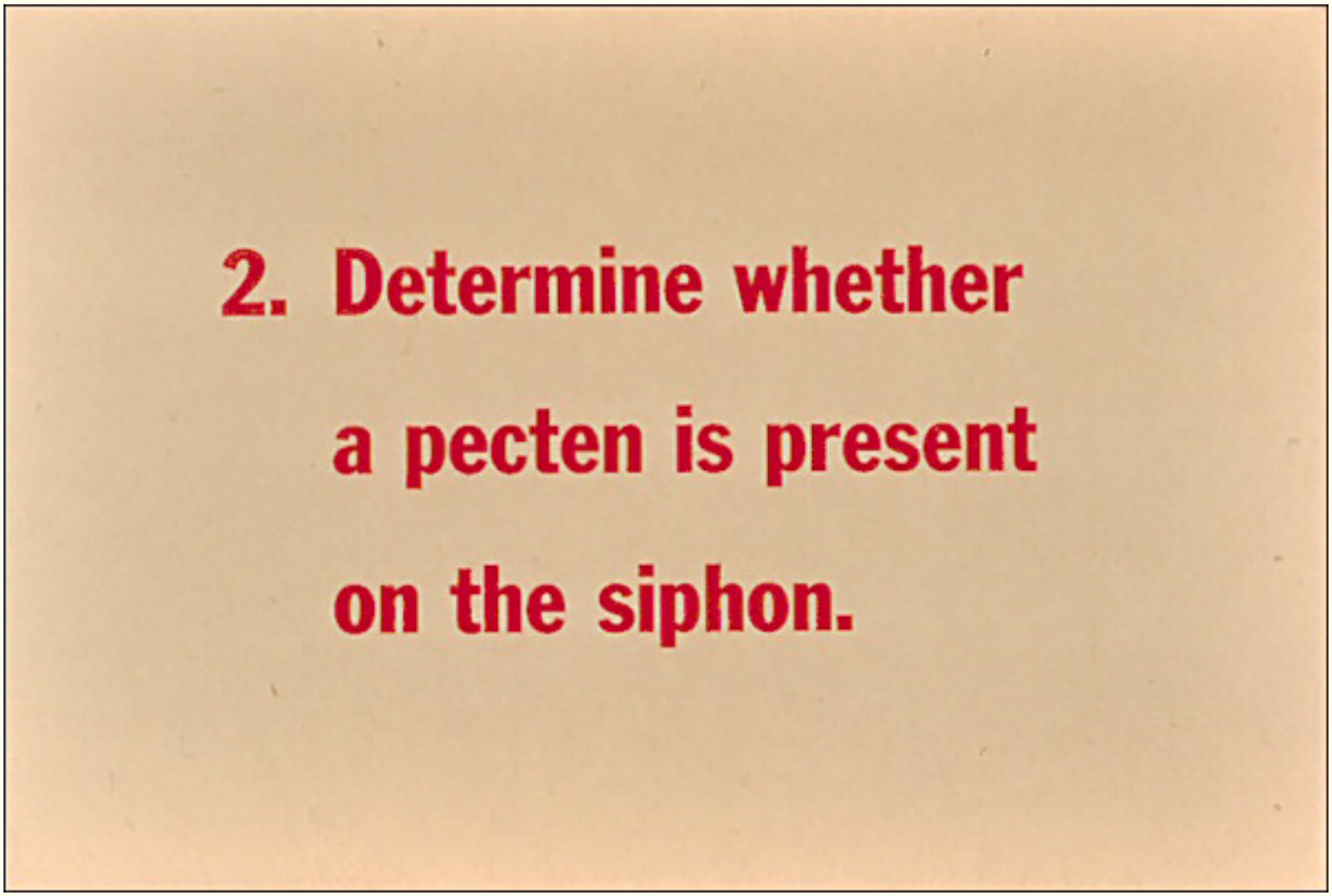

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The remaining genera may then be divided into two groups. Three genera have no pecten, while the other six genera have a pecten present.

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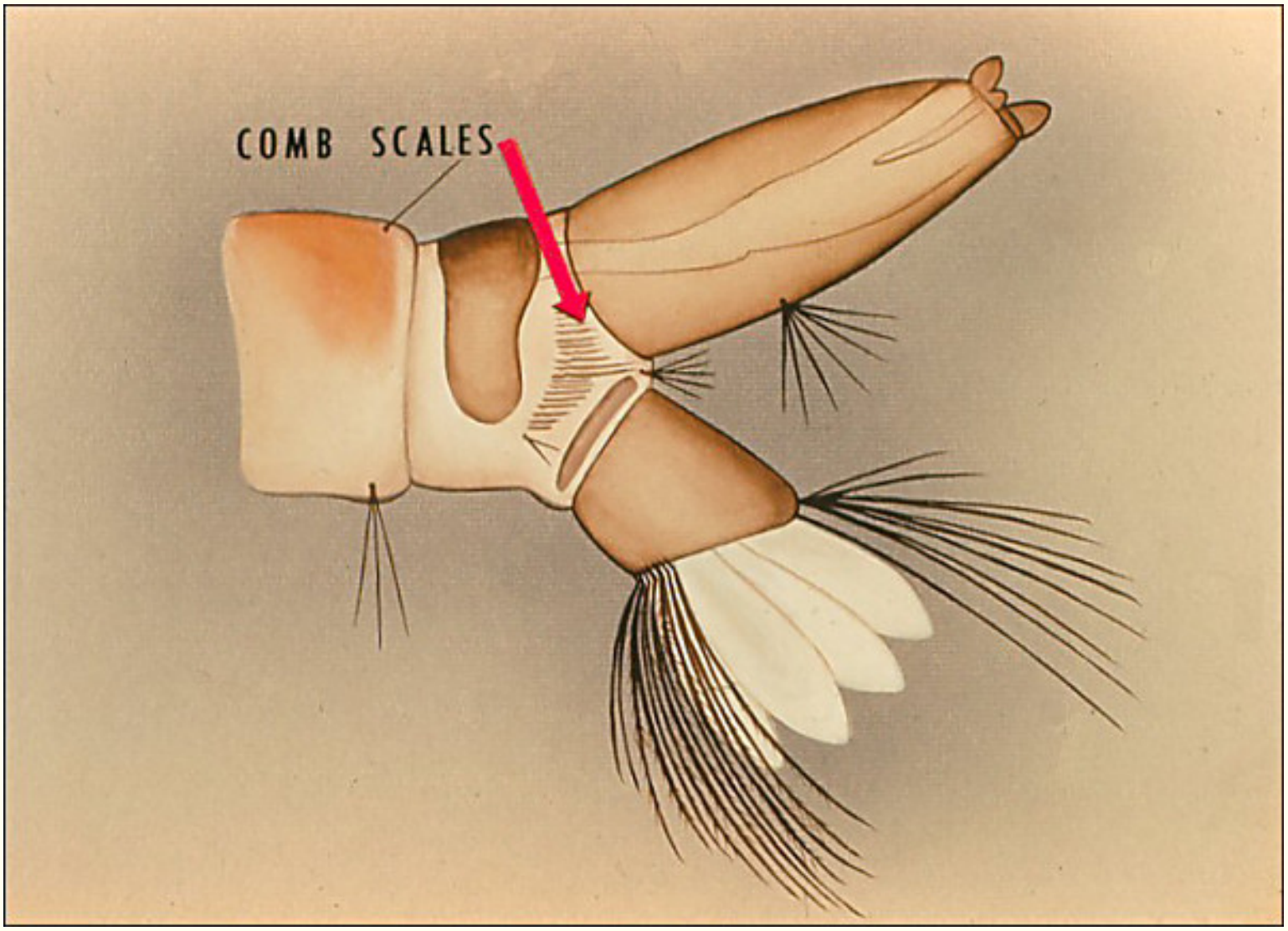

In the group without a pecten, see if comb scales are present.

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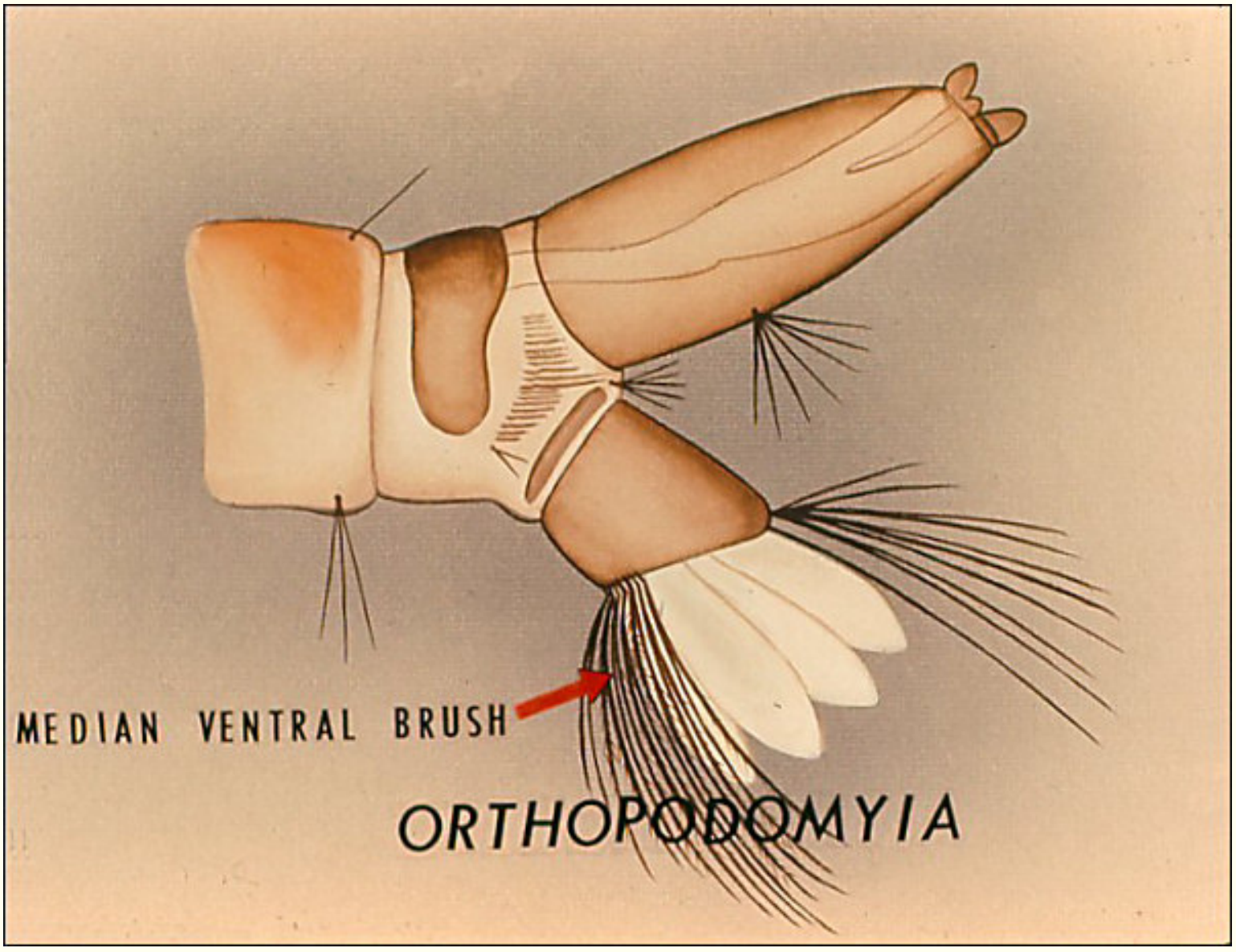

If comb scales are present and a median ventral brush is also present, the mosquito is a member of the genus *Orthopodomyia*.

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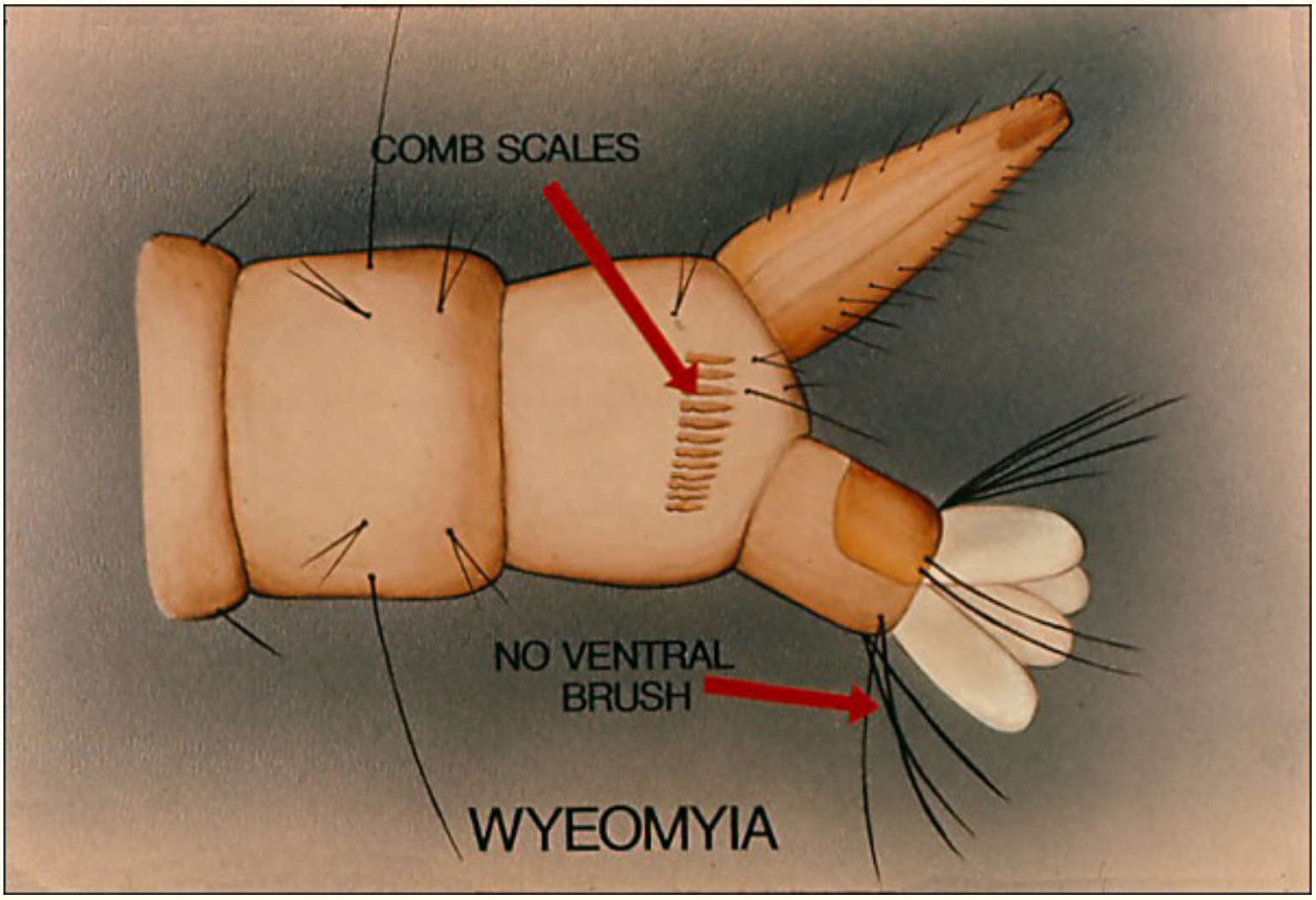

The genus *Wyeomyia* has comb scales but lacks the median ventral brush.

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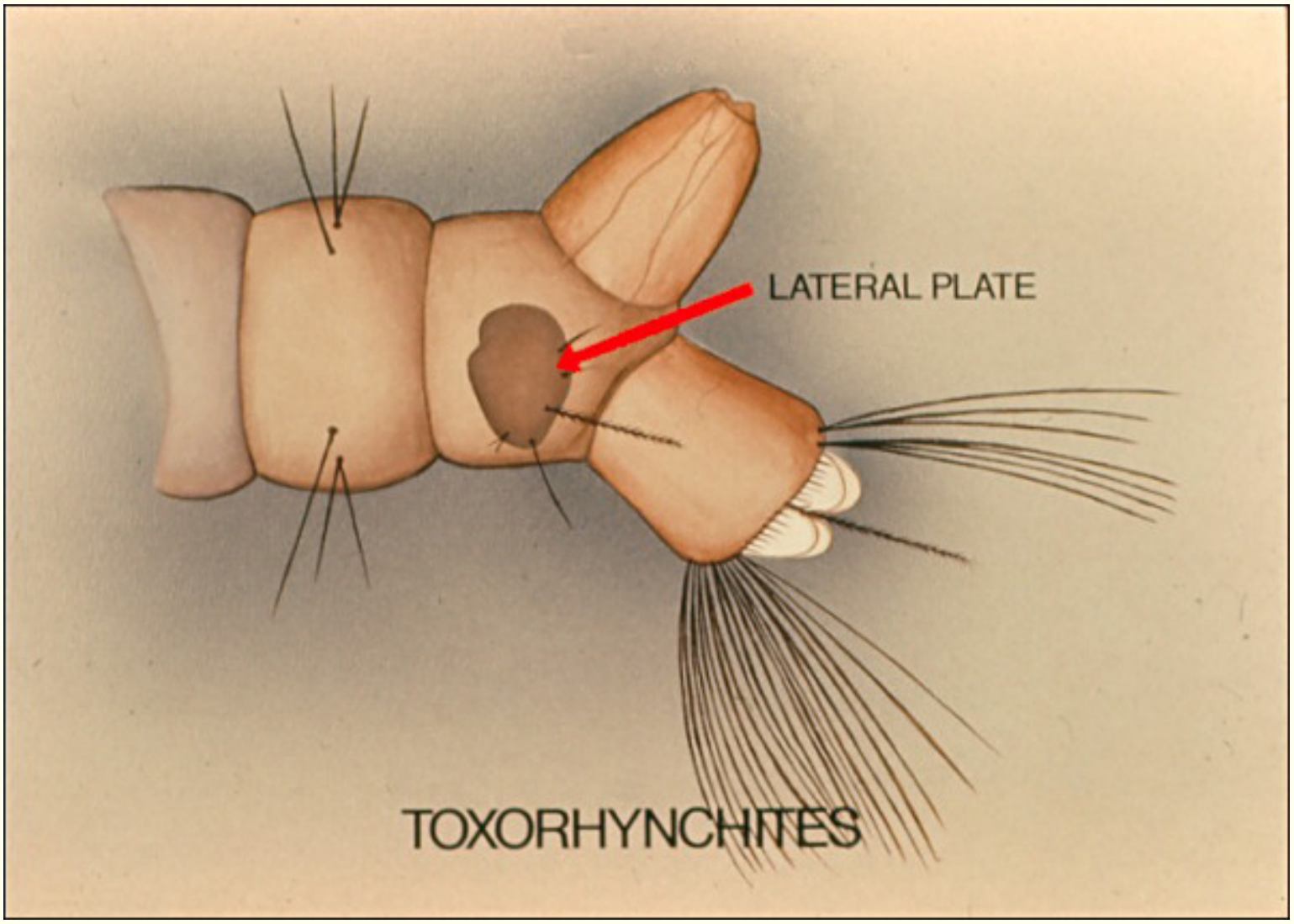

If comb scales are absent and if a heavily sclerotized lateral plate bearing long spinulose hairs is present on the eighth abdominal segment, the genus is *Toxorhynchites*.

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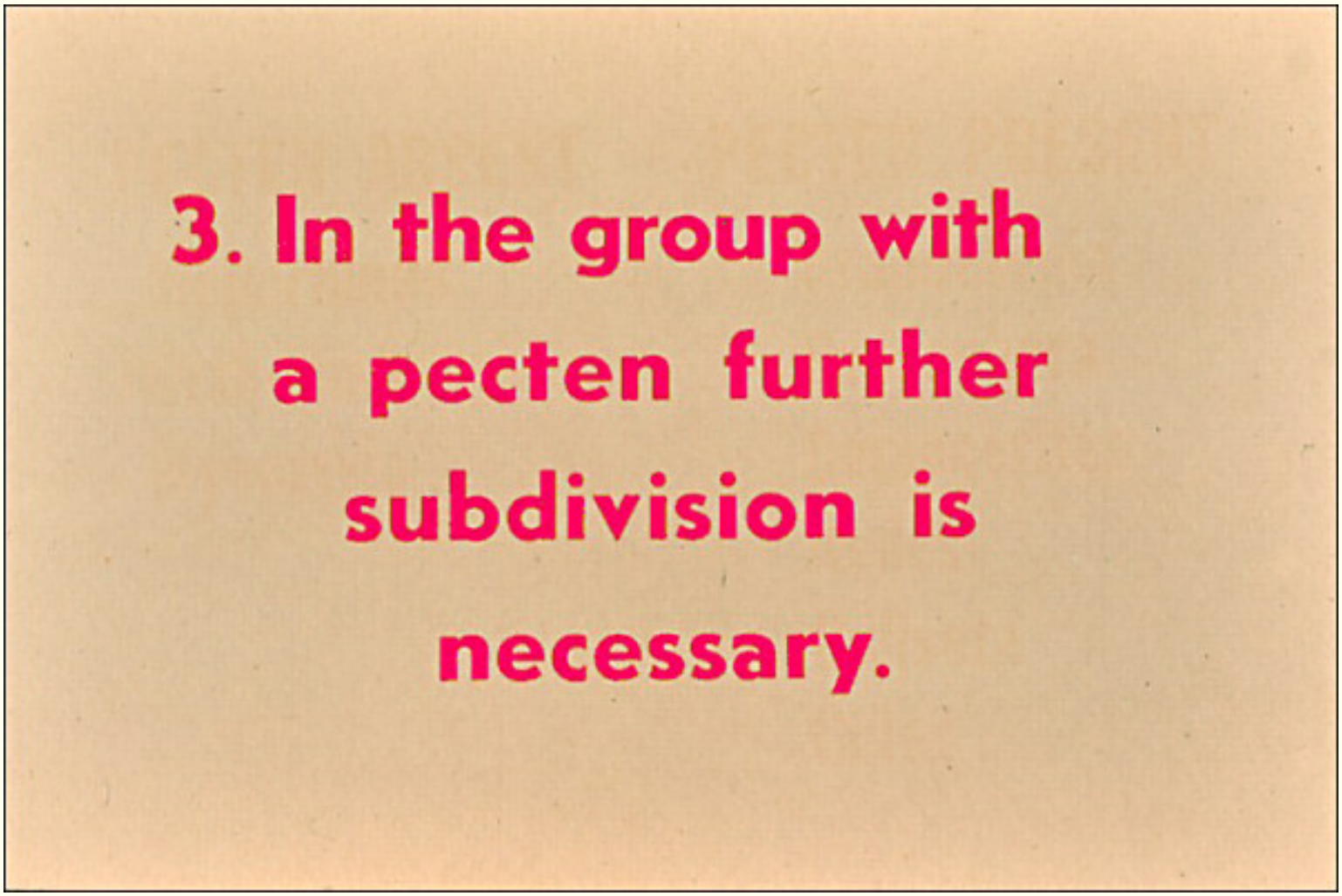

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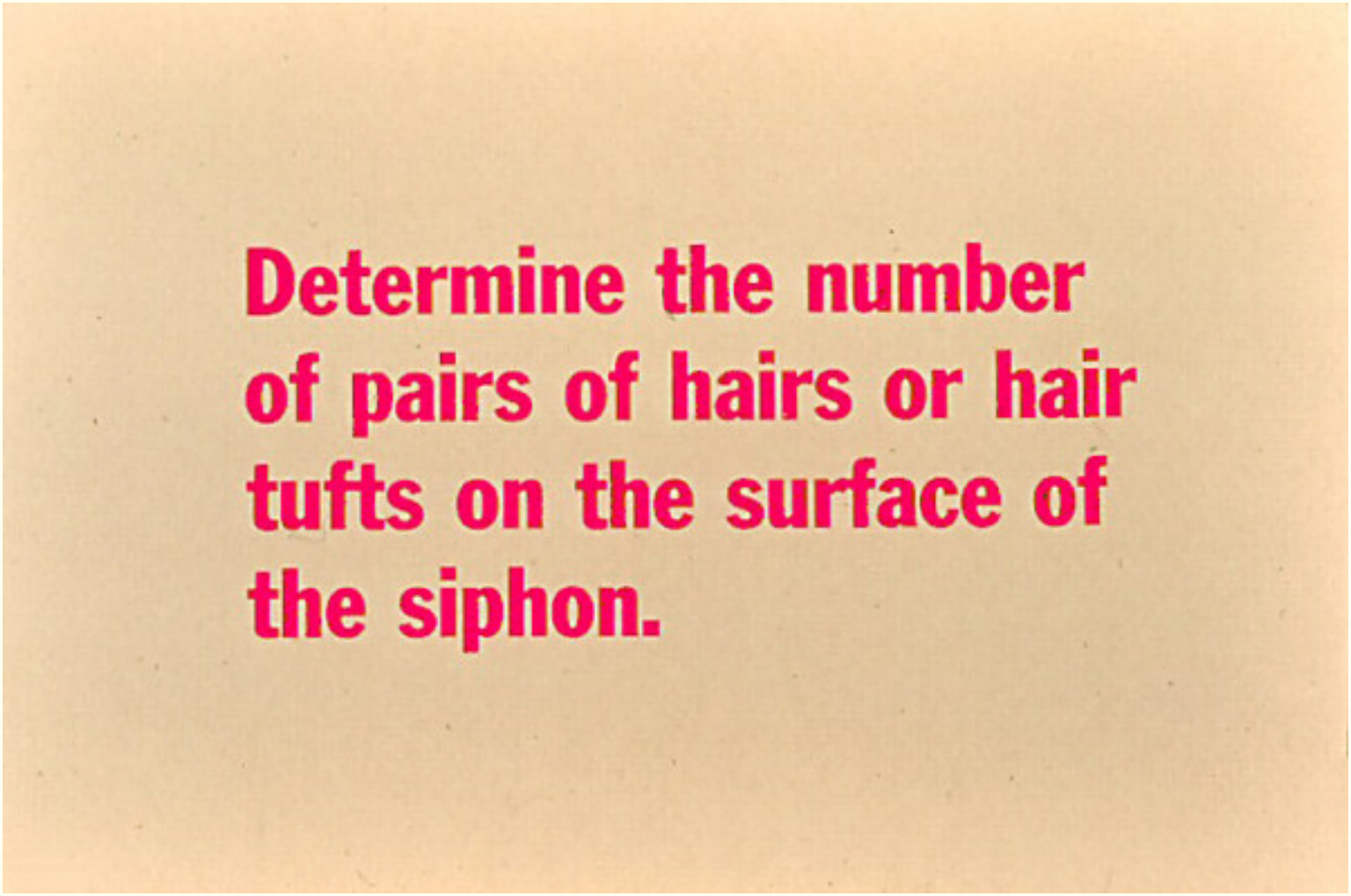

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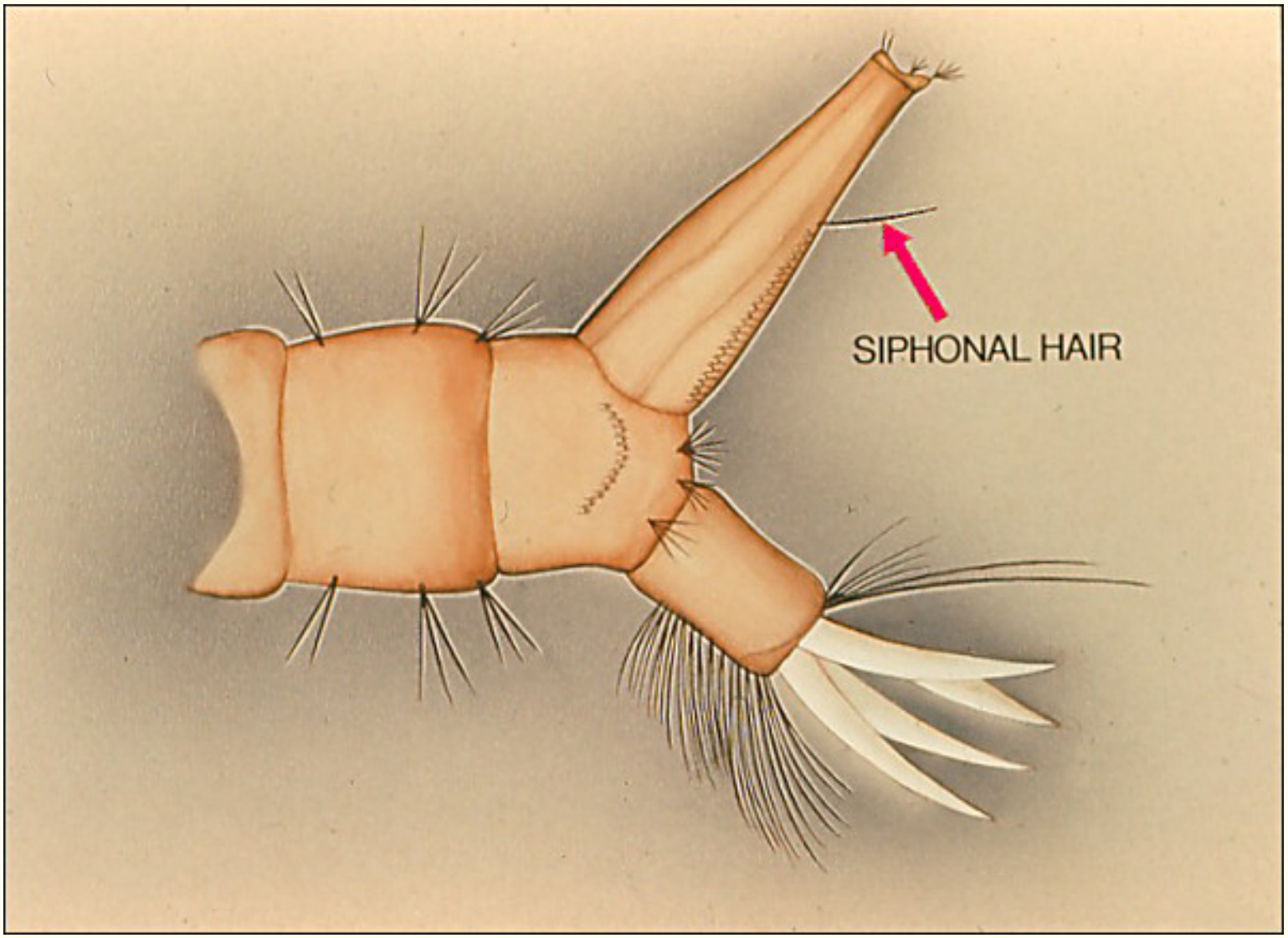

If only one pair of hairs or hair tufts is present, the mosquito belongs to one of these genera: *Uranotaenia, Psorophora*, or *Aedes*.

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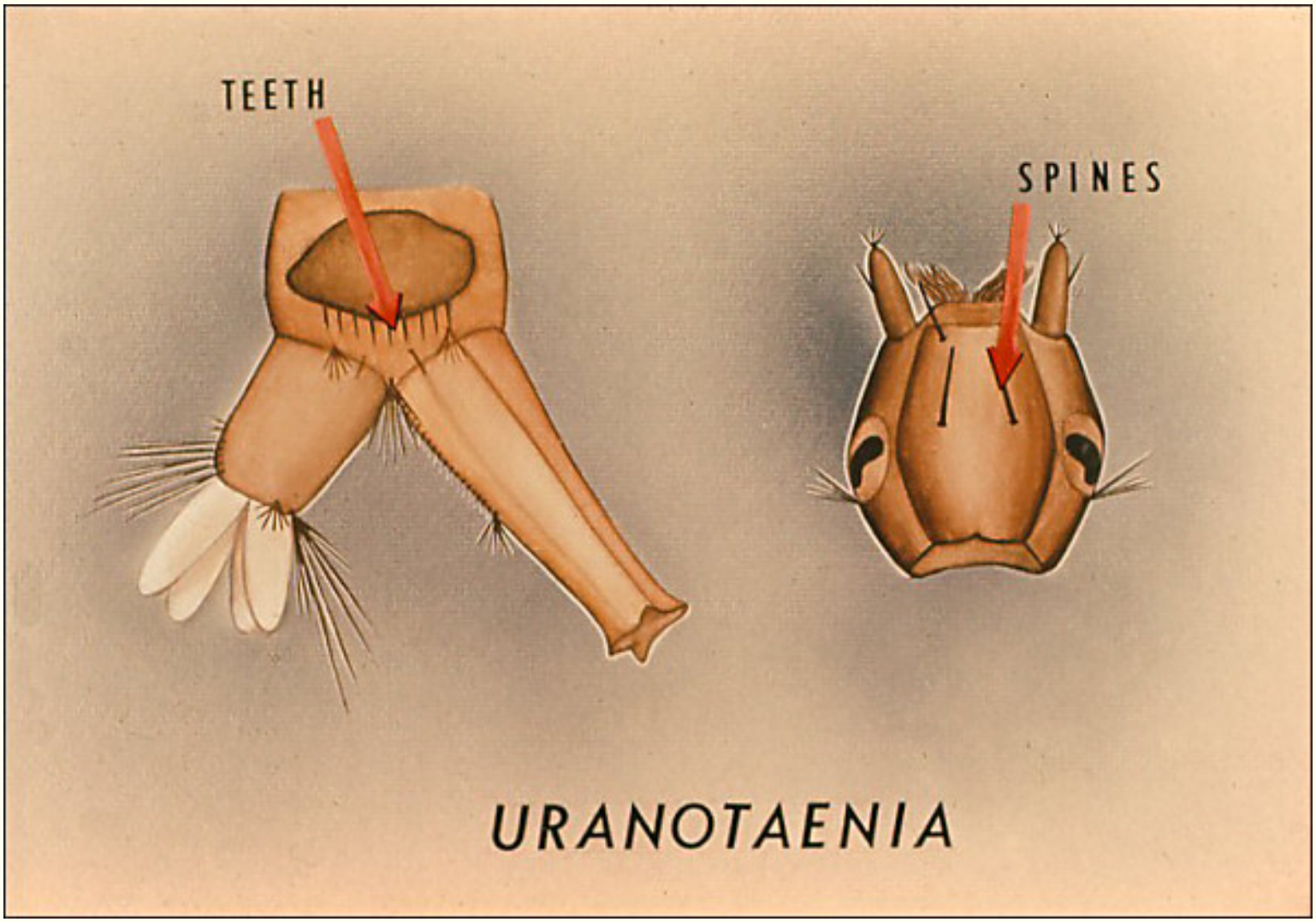

If a row of teeth arise from a lateral sclerotized plate on the eighth abdominal segment, the genus is *Uranotaenia*. The four stout spines on the head are characteristic of most species.

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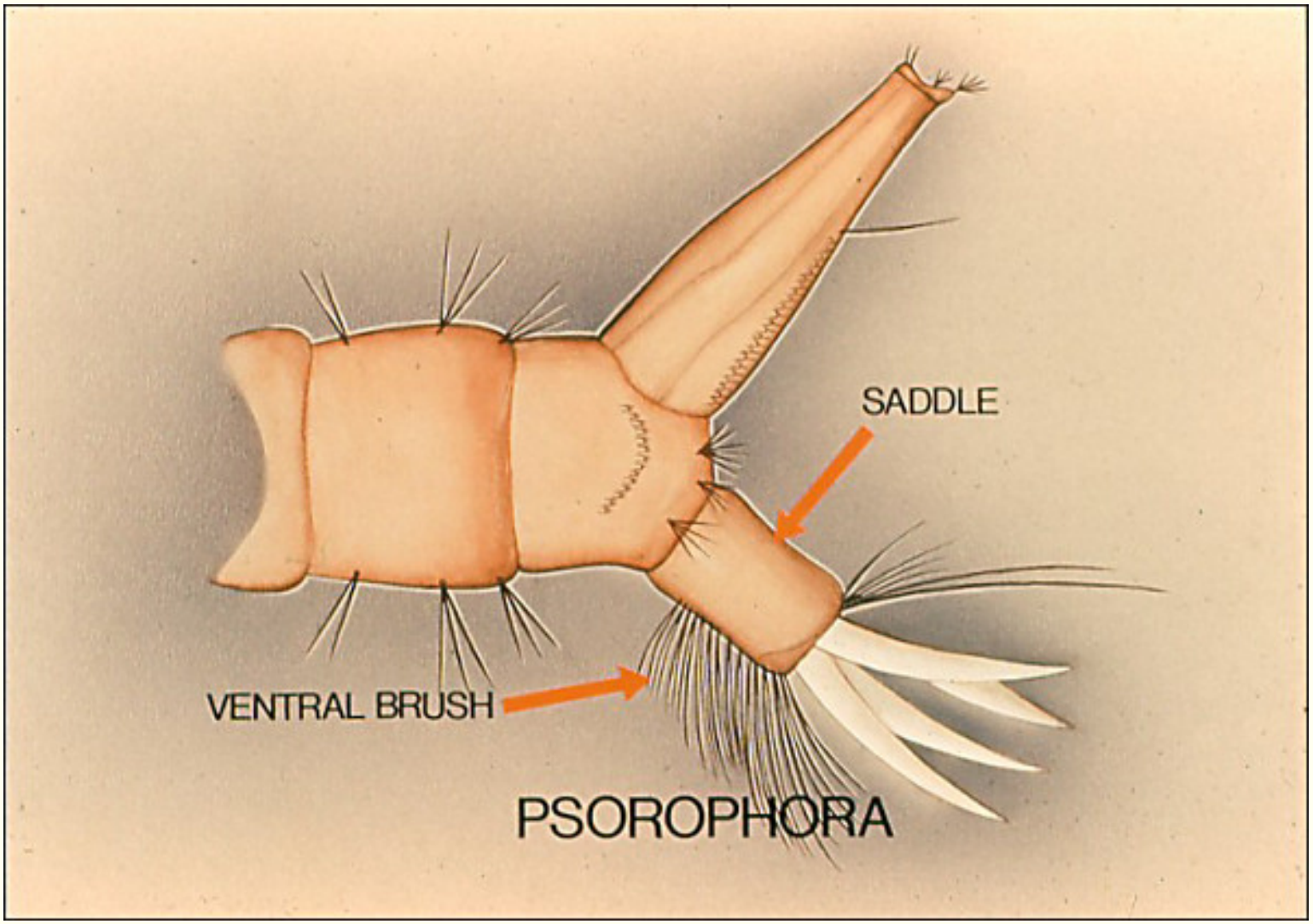

If tufts of the ventral brush are attached to the saddle which completely encircles the anal segment, the genus is *Psorophora*.

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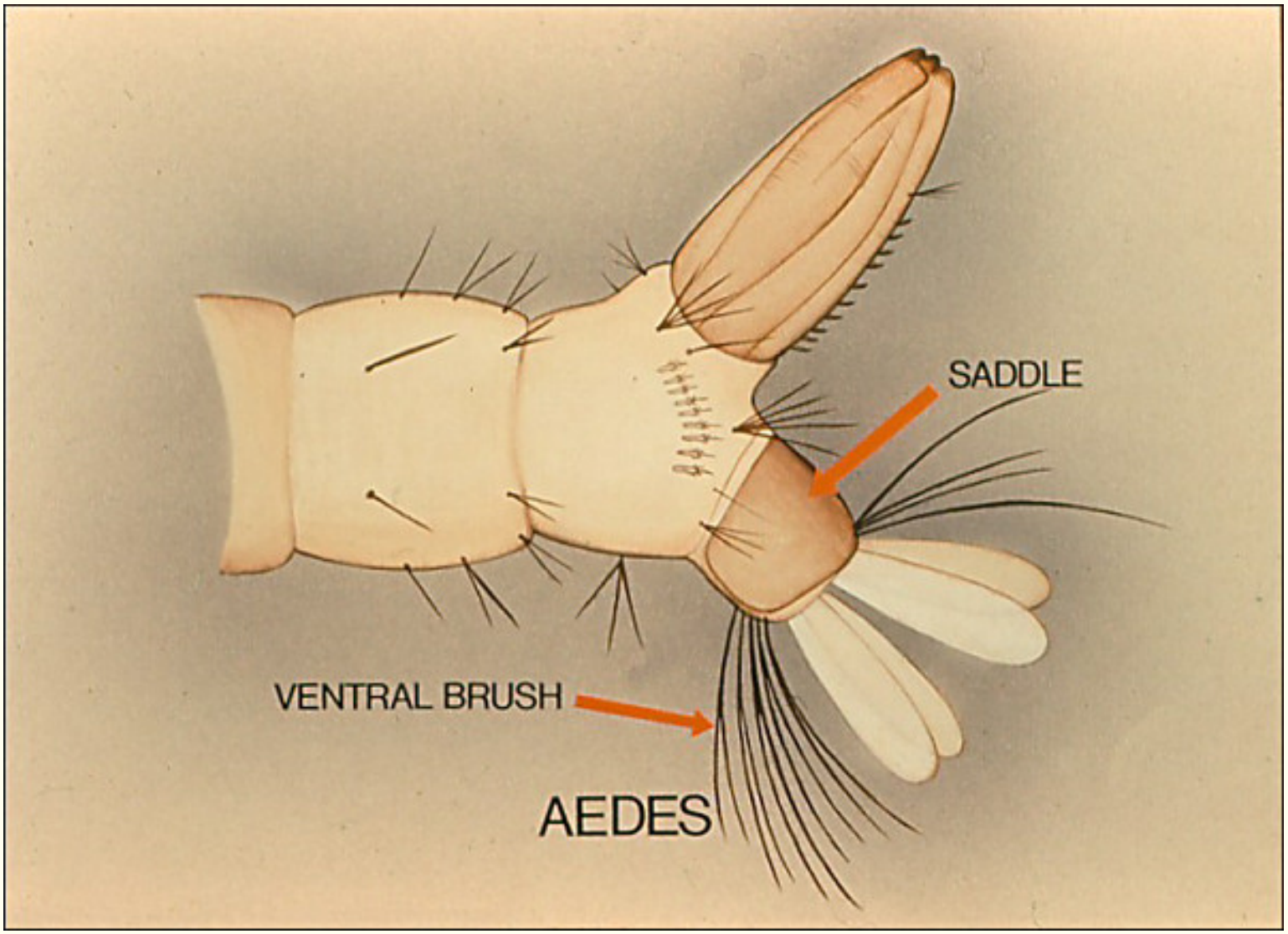

If the saddle completely encircles the anal segment and tufts of the ventral brush are posterior to it, or if the saddle does not encircle the anal segment entirely, the mosquito is a member of the genus *Aedes*.

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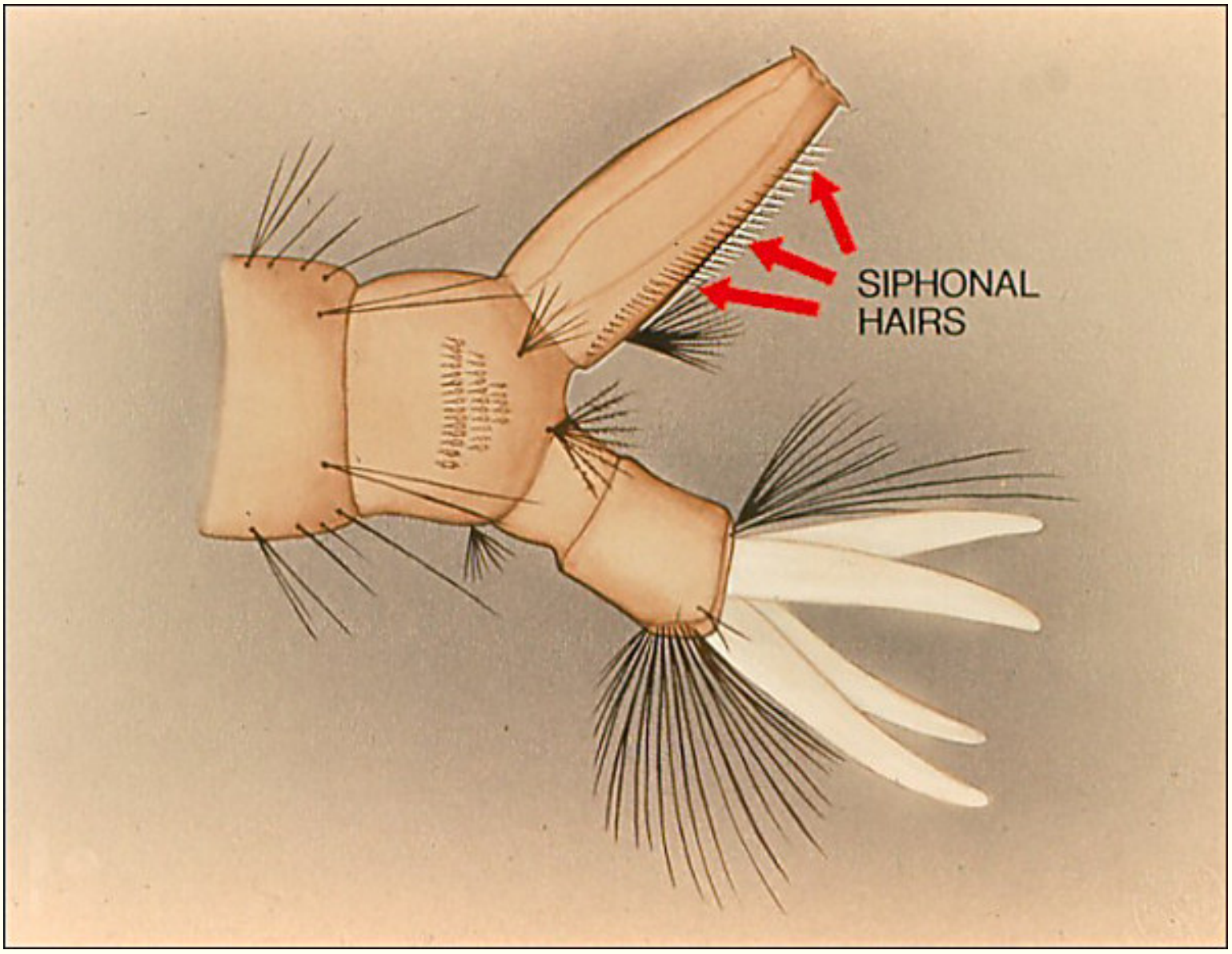

If several pairs of tufts or single hairs are present on the siphon, the mosquito belongs to the genus *Deinocerites, Culiseta*, or *Culex*.

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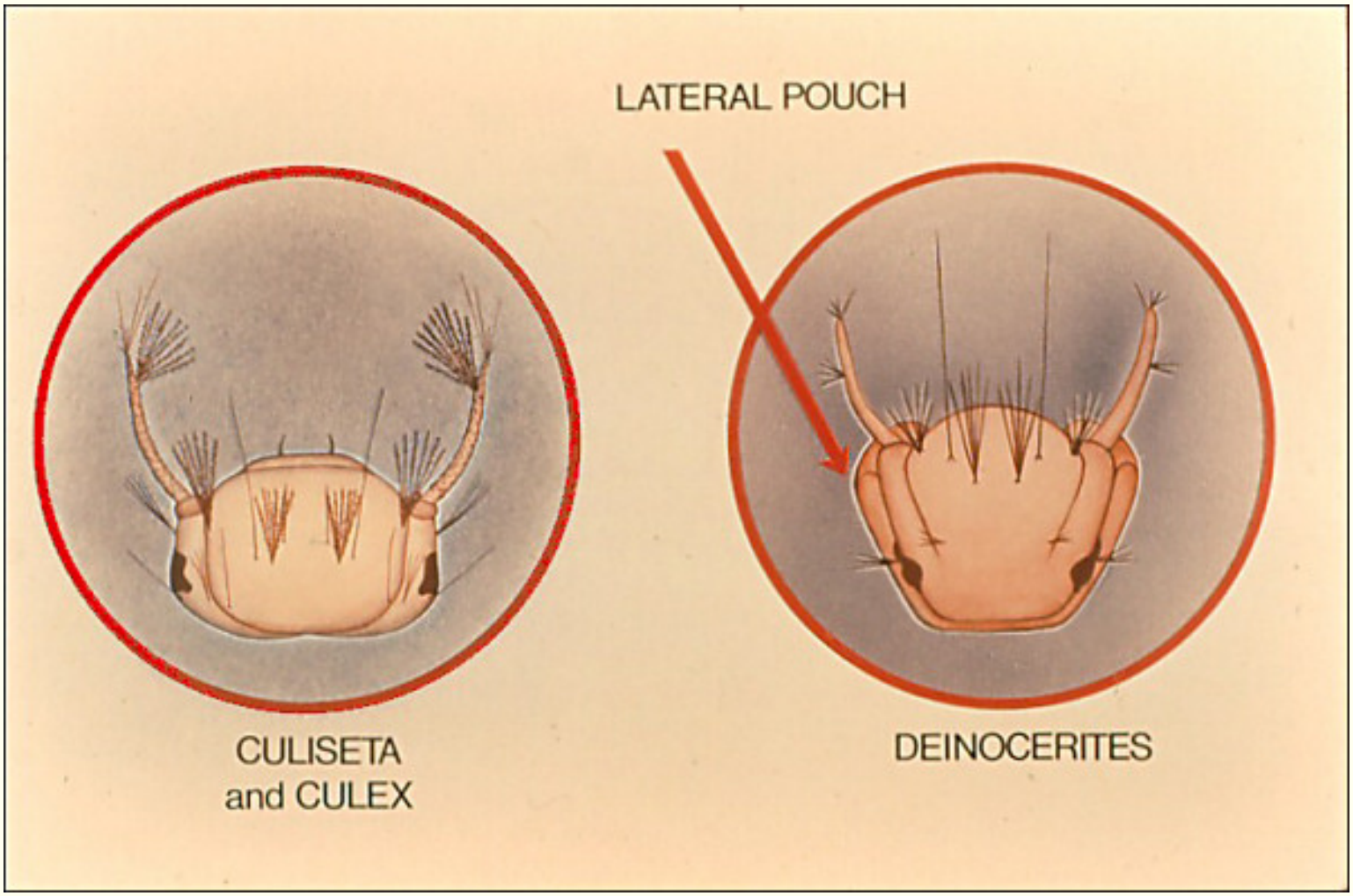

The lateral pouches on the head distinguish members of the genus *Deinocerites* from *Culex* and *Culiseta*.

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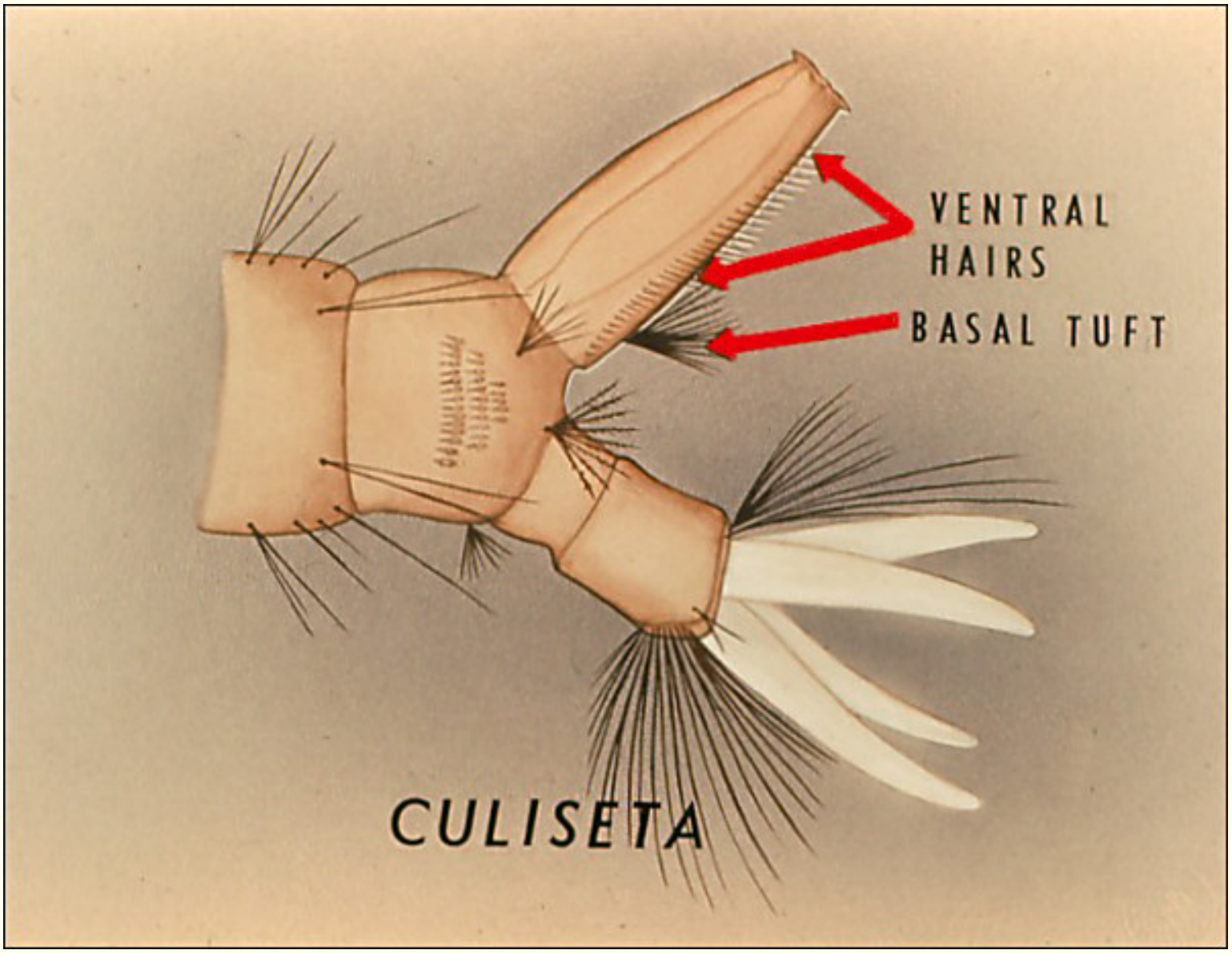

If a pair of tufts also occurs near the base of the siphon, and a row of tufts or a row of straight hairs, or no additional hairs or tufts follows the pecten, the genus is *Culiseta*.

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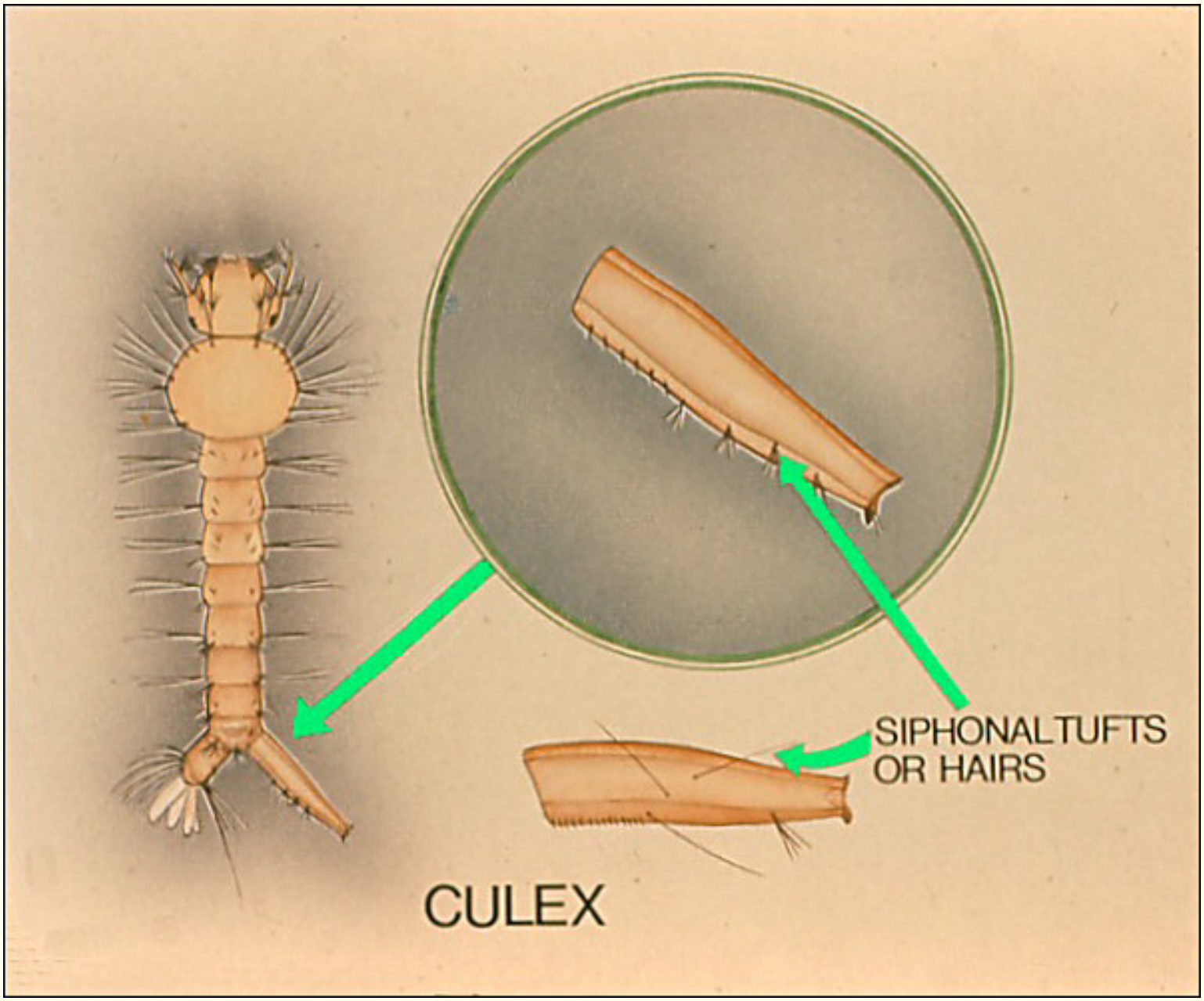

If basal tufts are absent and if a row of tufts or scattered hairs

occurs along each side of the siphon, the genus is *Culex*.

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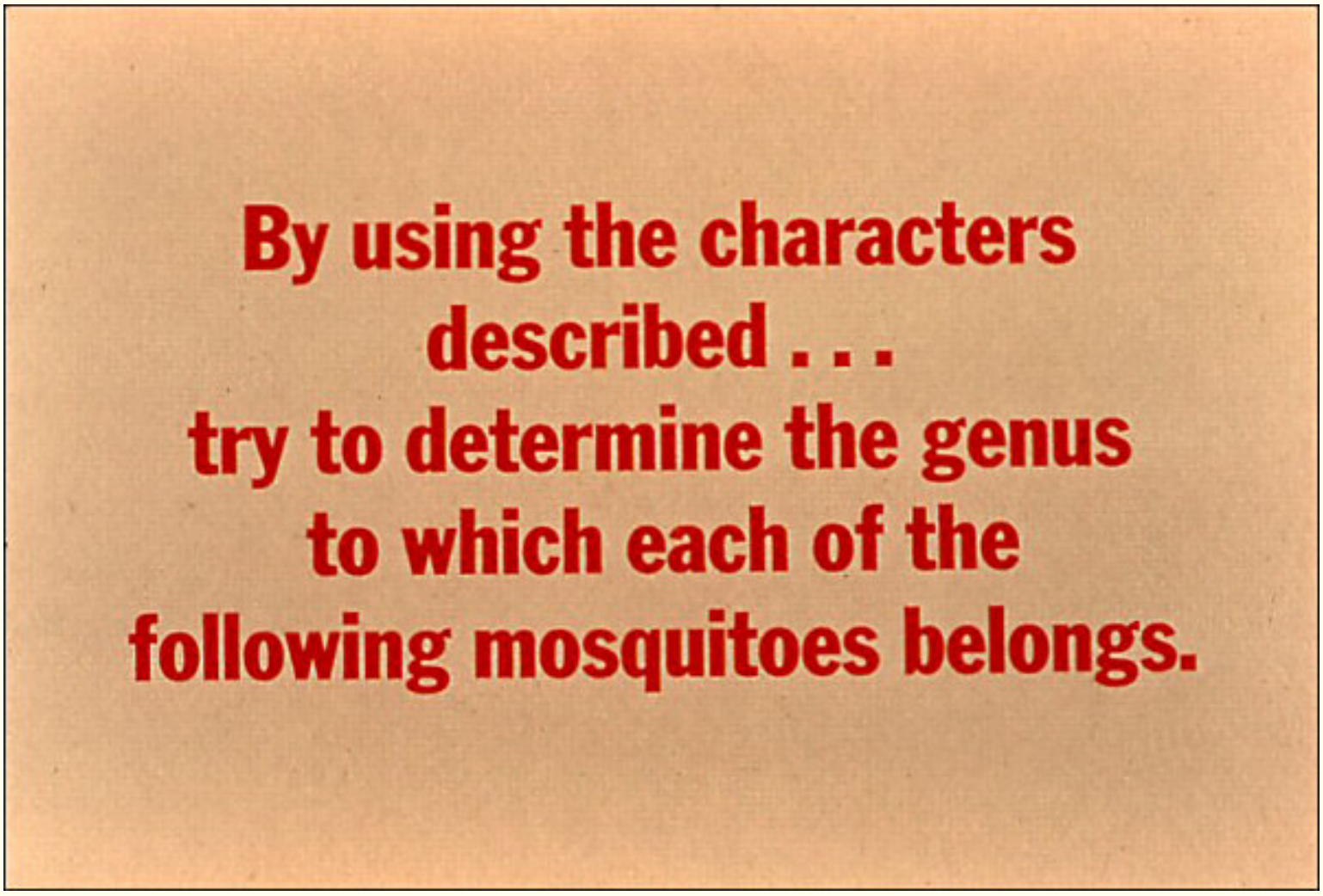

By using the characters described, try to determine the genera to which each of the following mosquitoes belongs.

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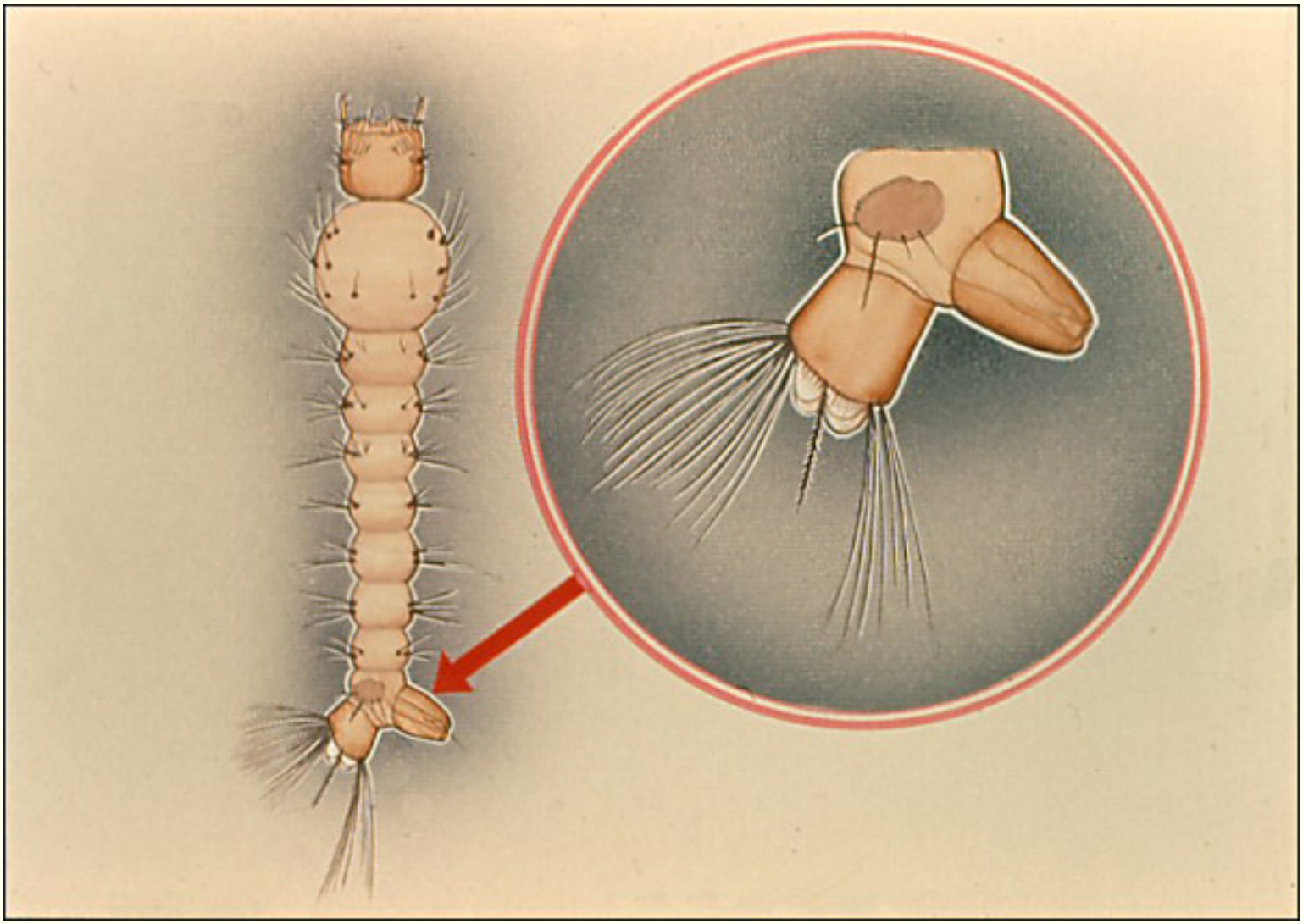

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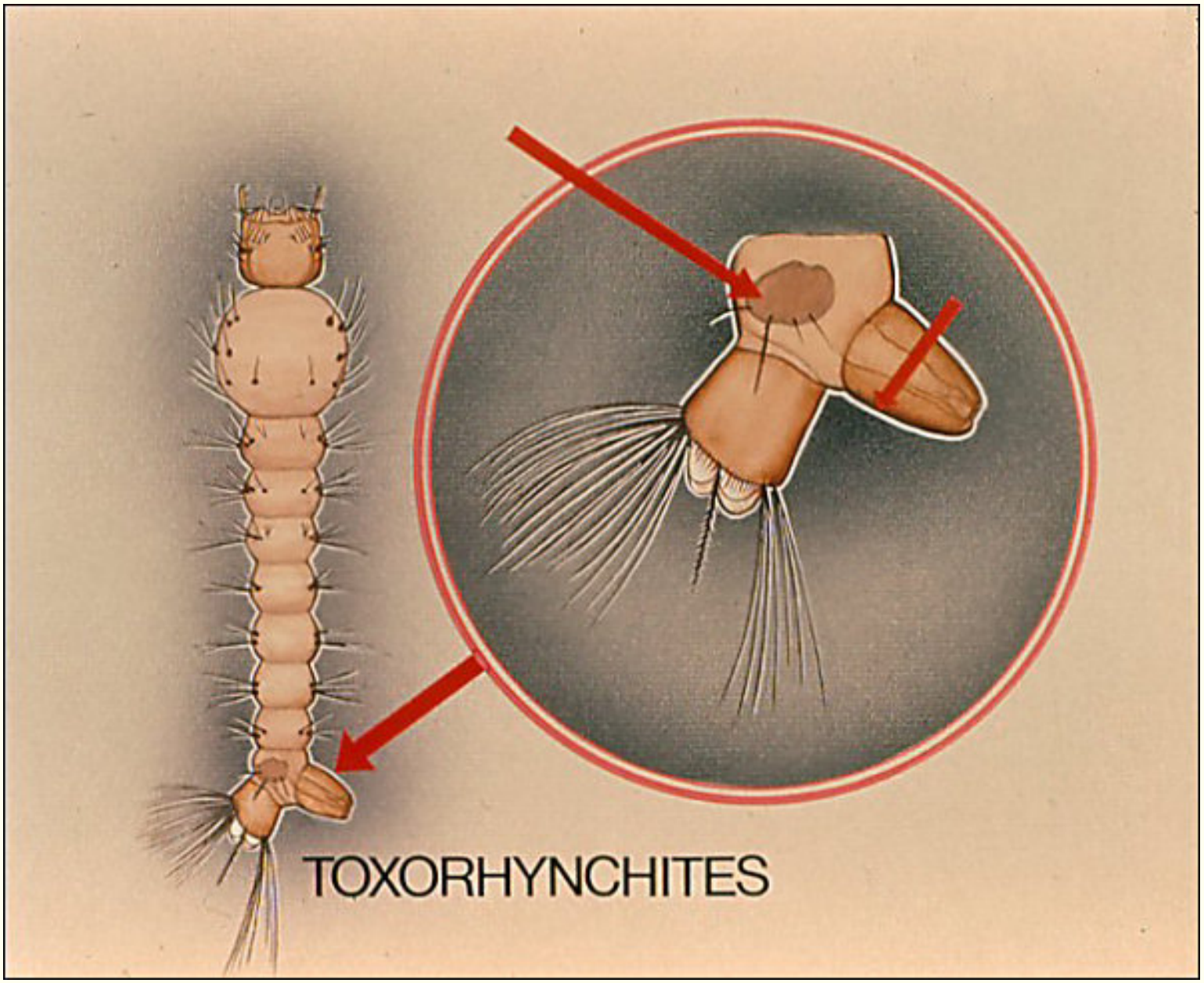

Absence of the pecten and presence of the lateral plate bearing spinulose hairs on the eighth abdominal segment characterize the

genus *Toxorhynchites*.

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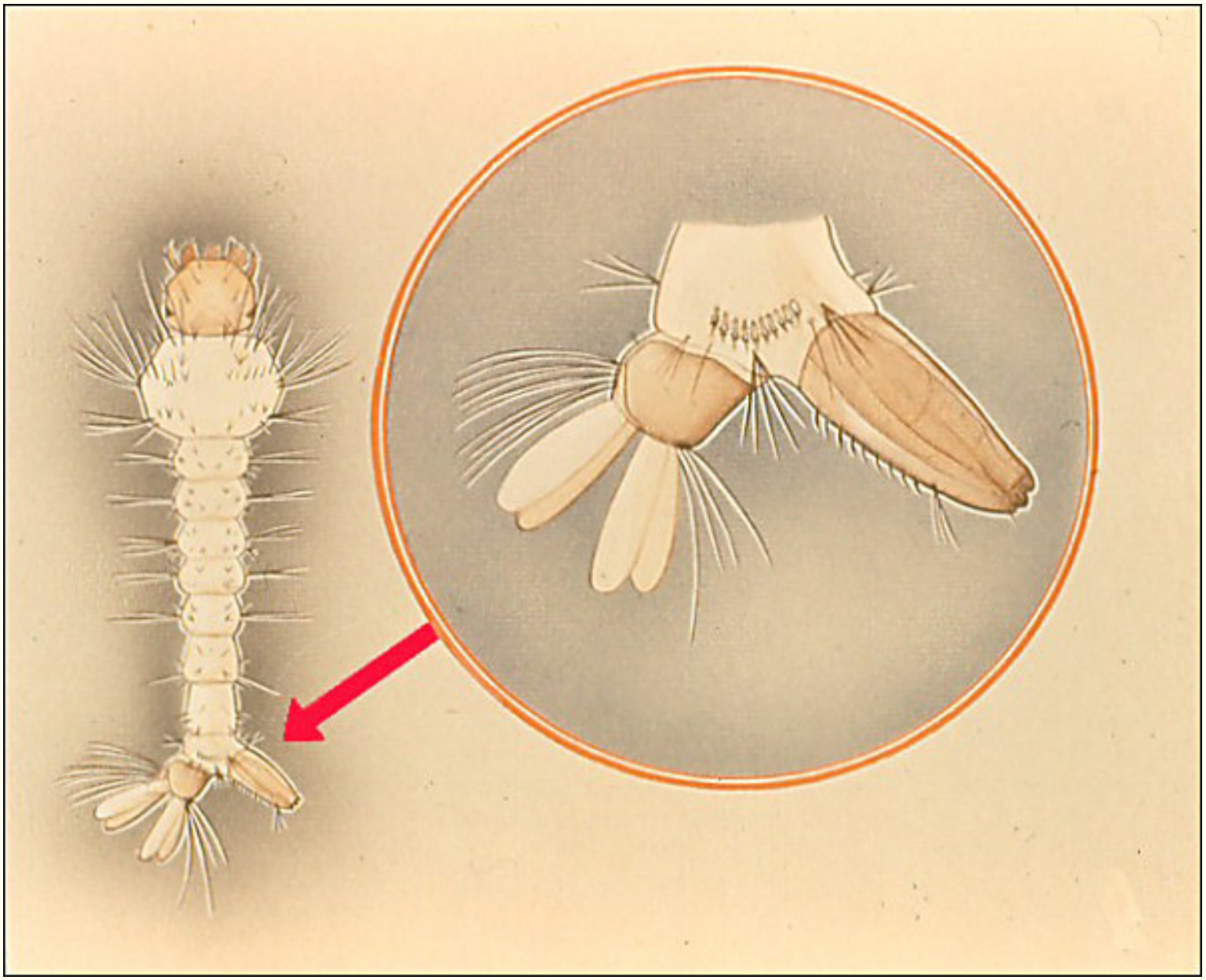

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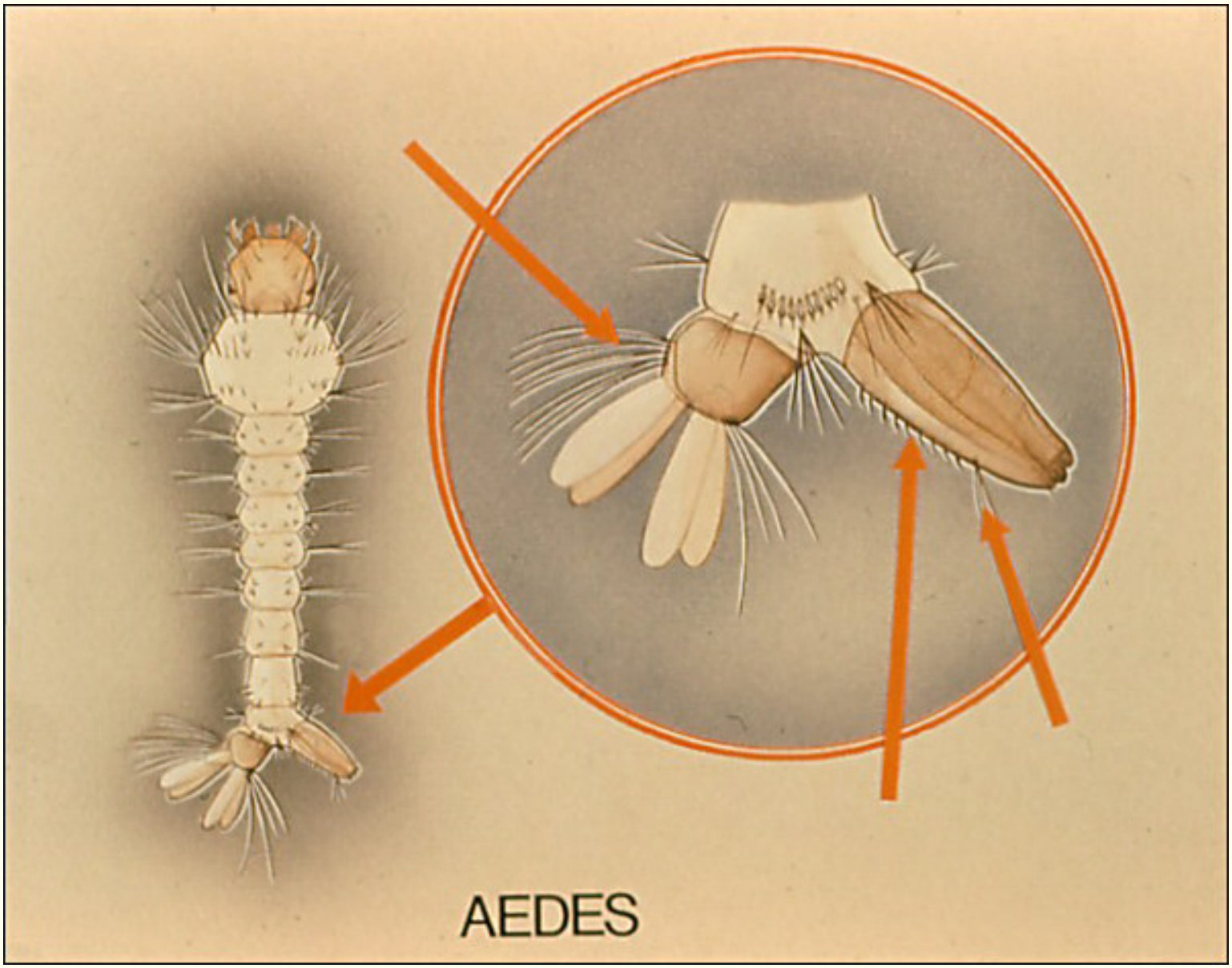

Aedes: note the presence of pecten, single pair of siphonal hair tufts, and median ventral brush attached posterior to the saddle.

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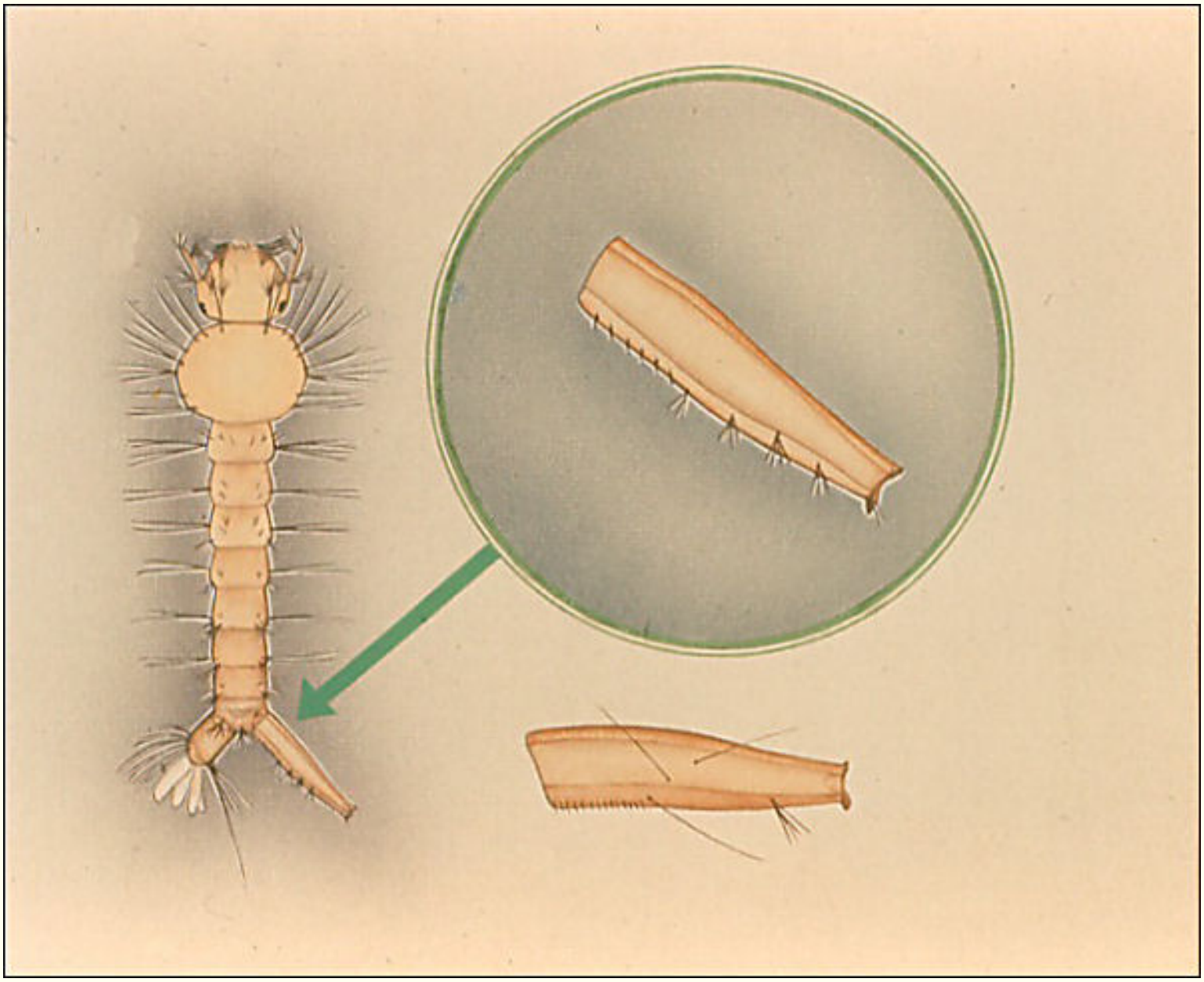

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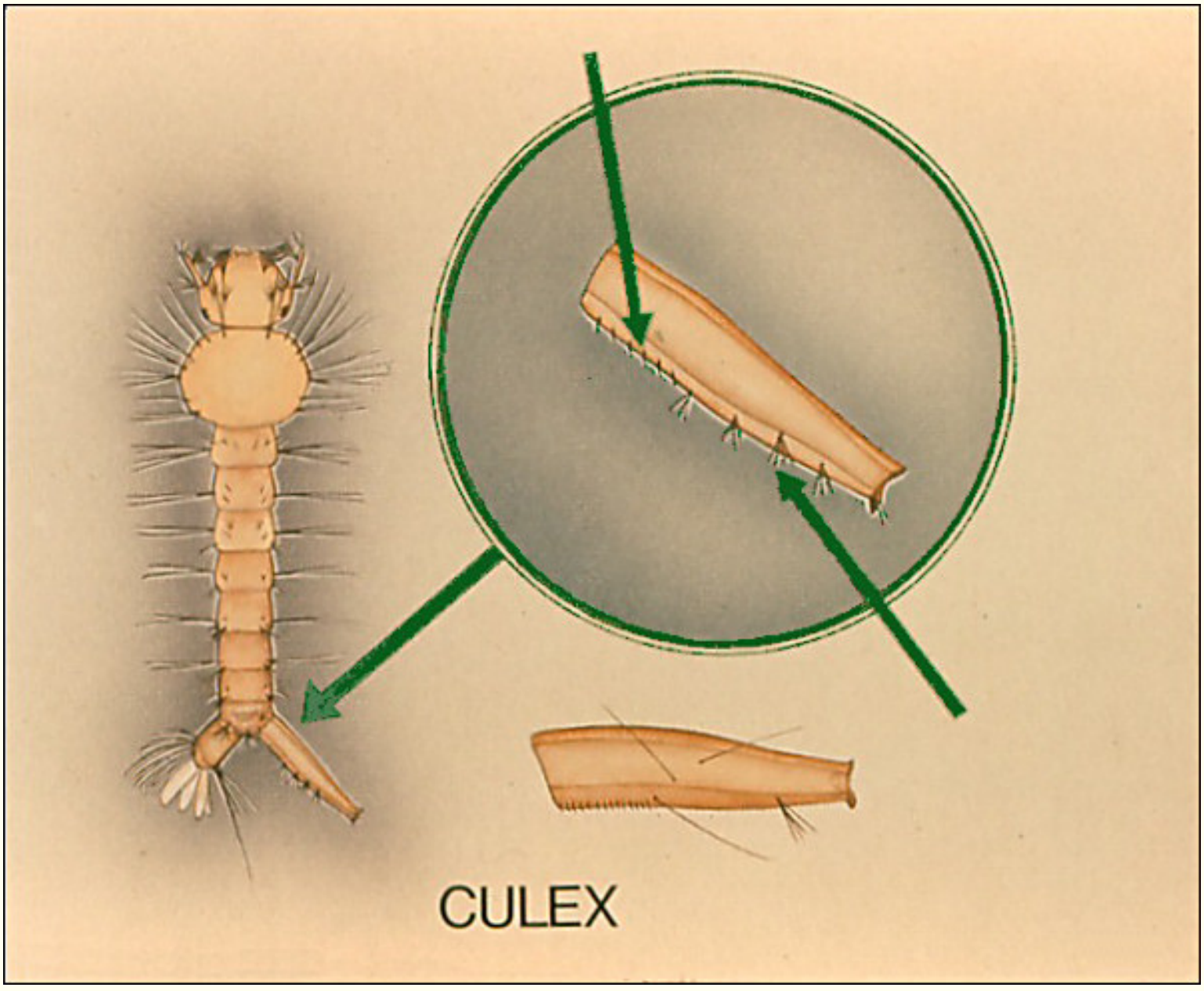

The pecten, the row of tufts or scattered hairs, and the absence of a

pair of hair tufts at the base of the siphon are characteristic of the genus *Culex*.

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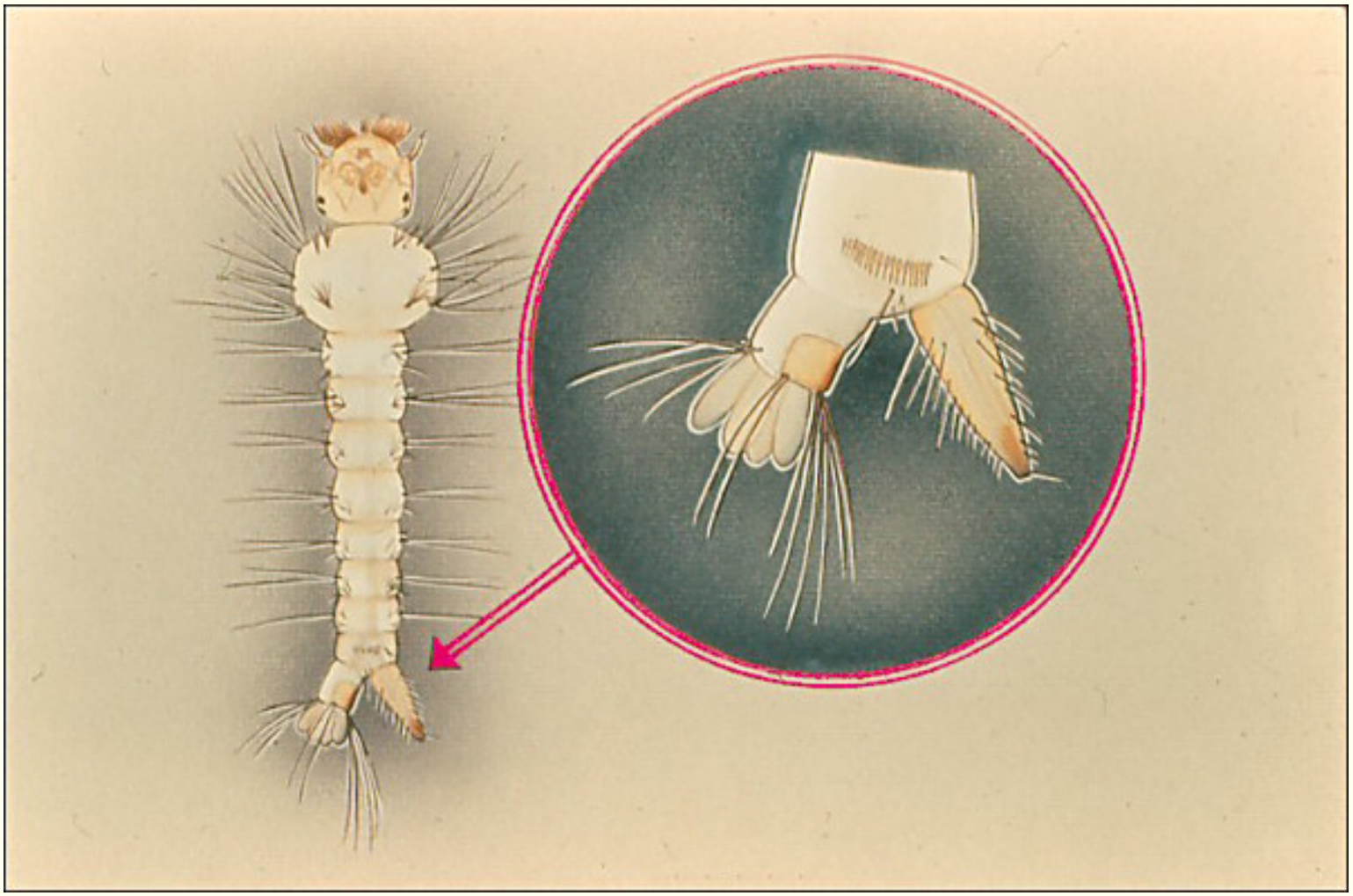

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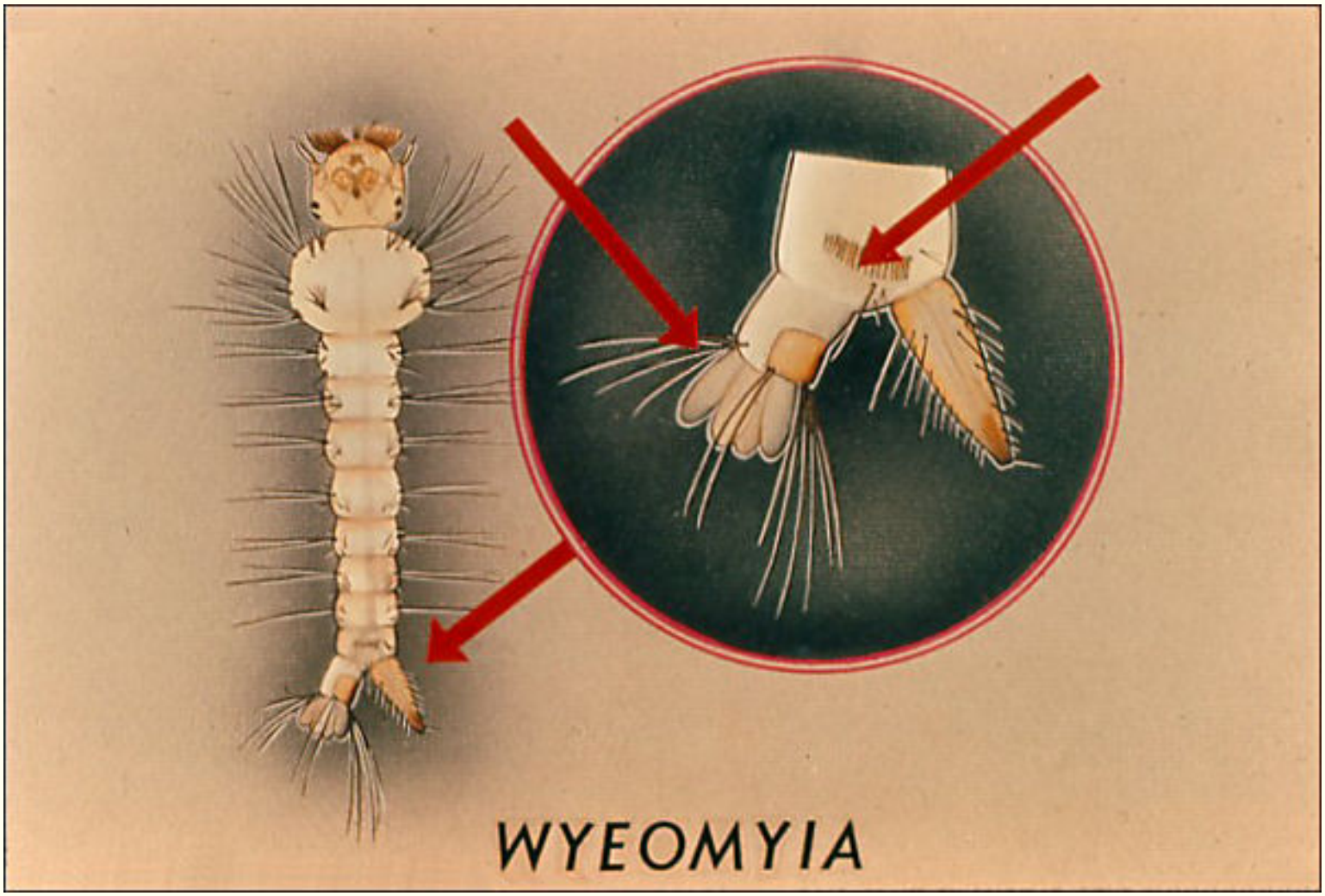

The absence of a pecten and median ventral brush permits easy identification of the genus *Wyeomyia*.

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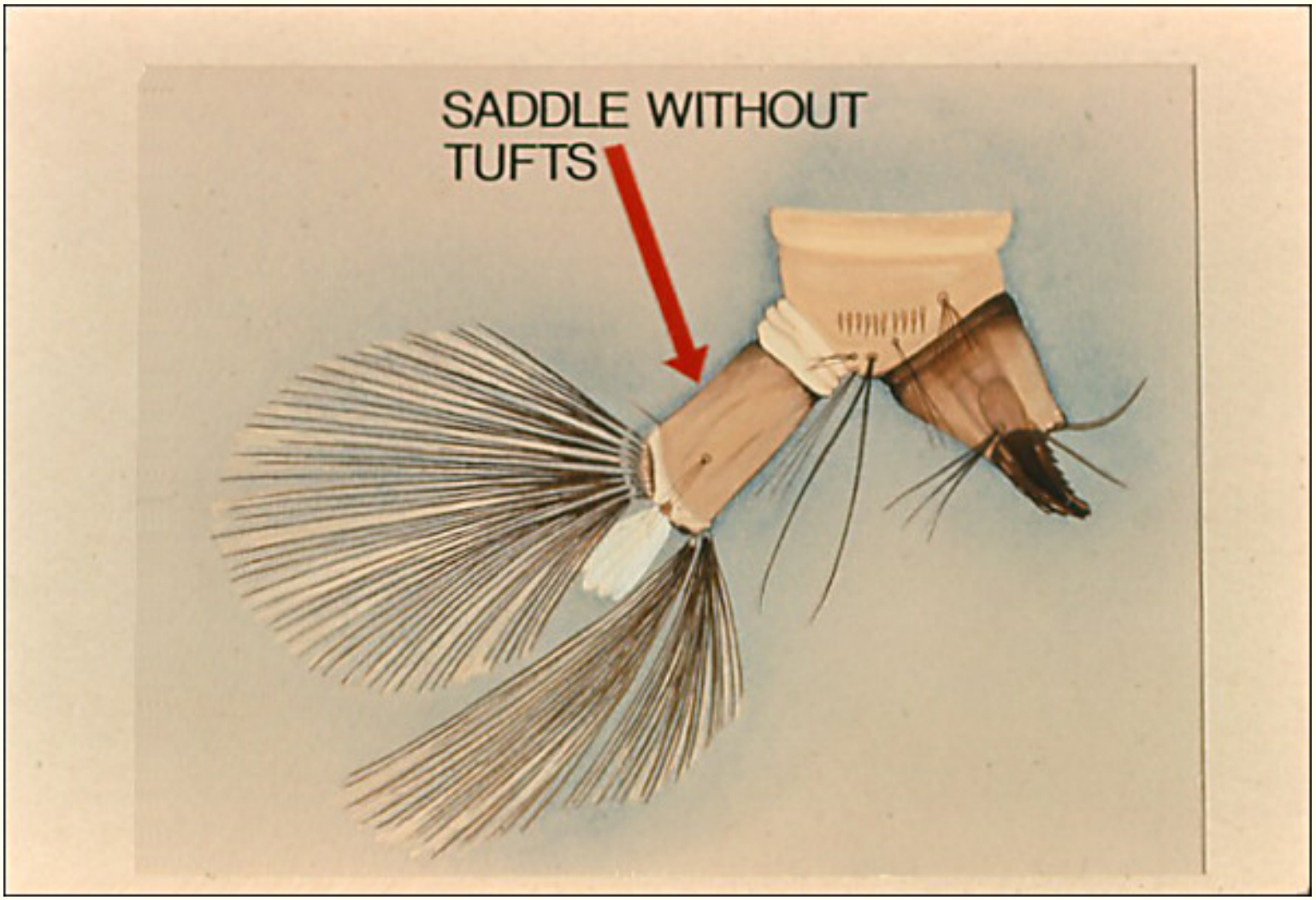

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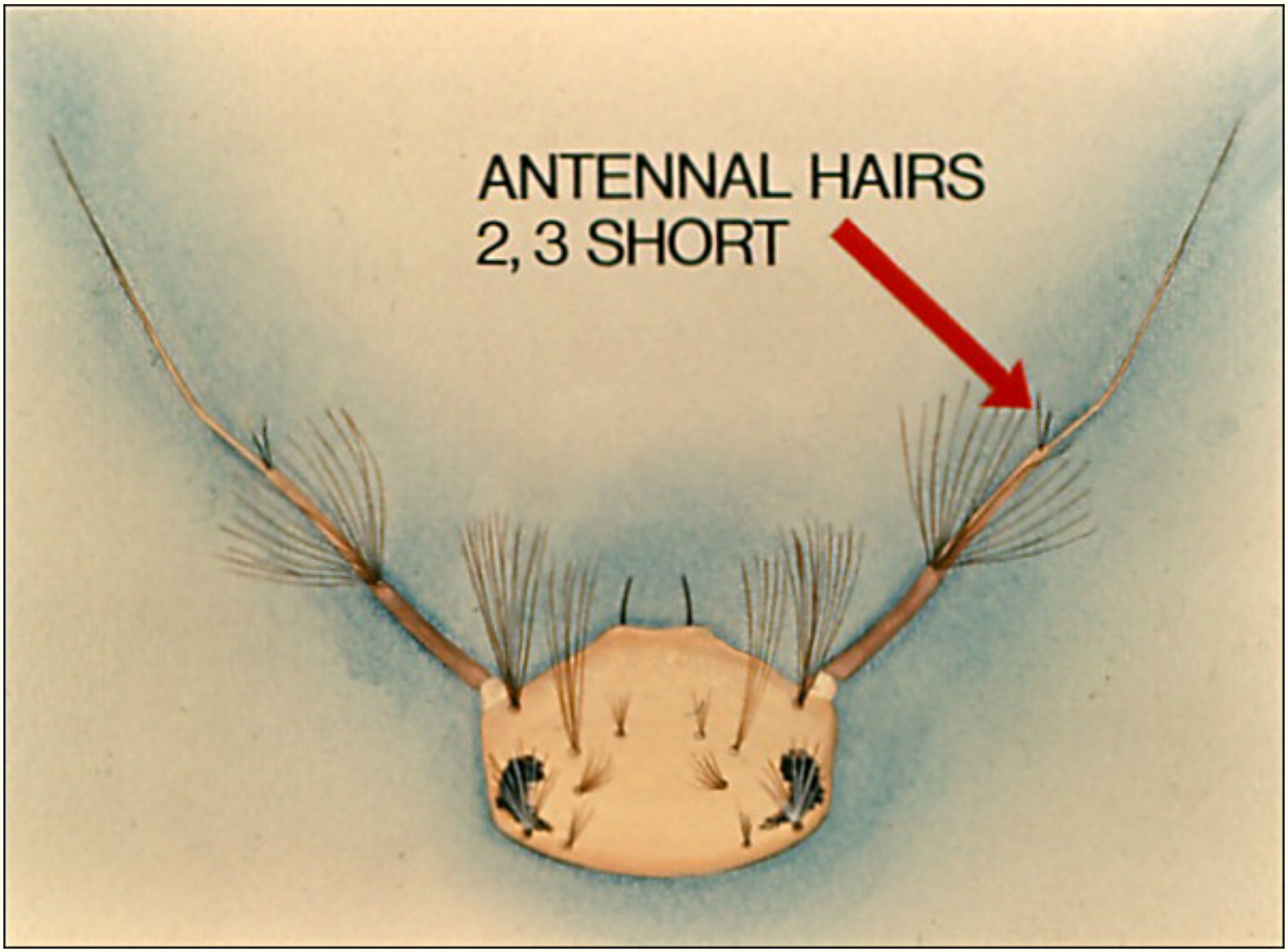

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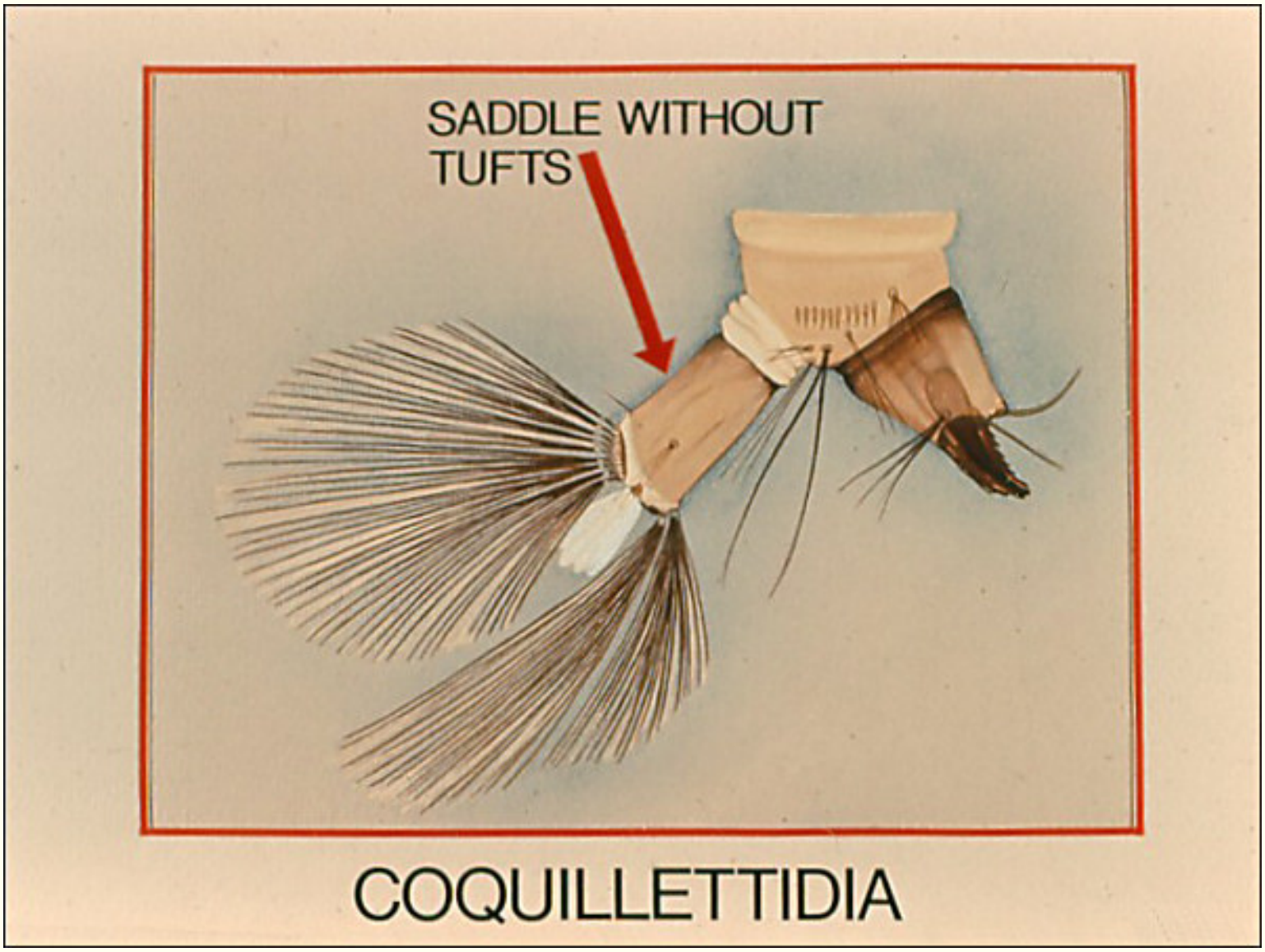

The genus *Coquillettidia* is readily recognized by the modified siphon, the absence of hair tufts on the ventral aspect of the saddle, . . .

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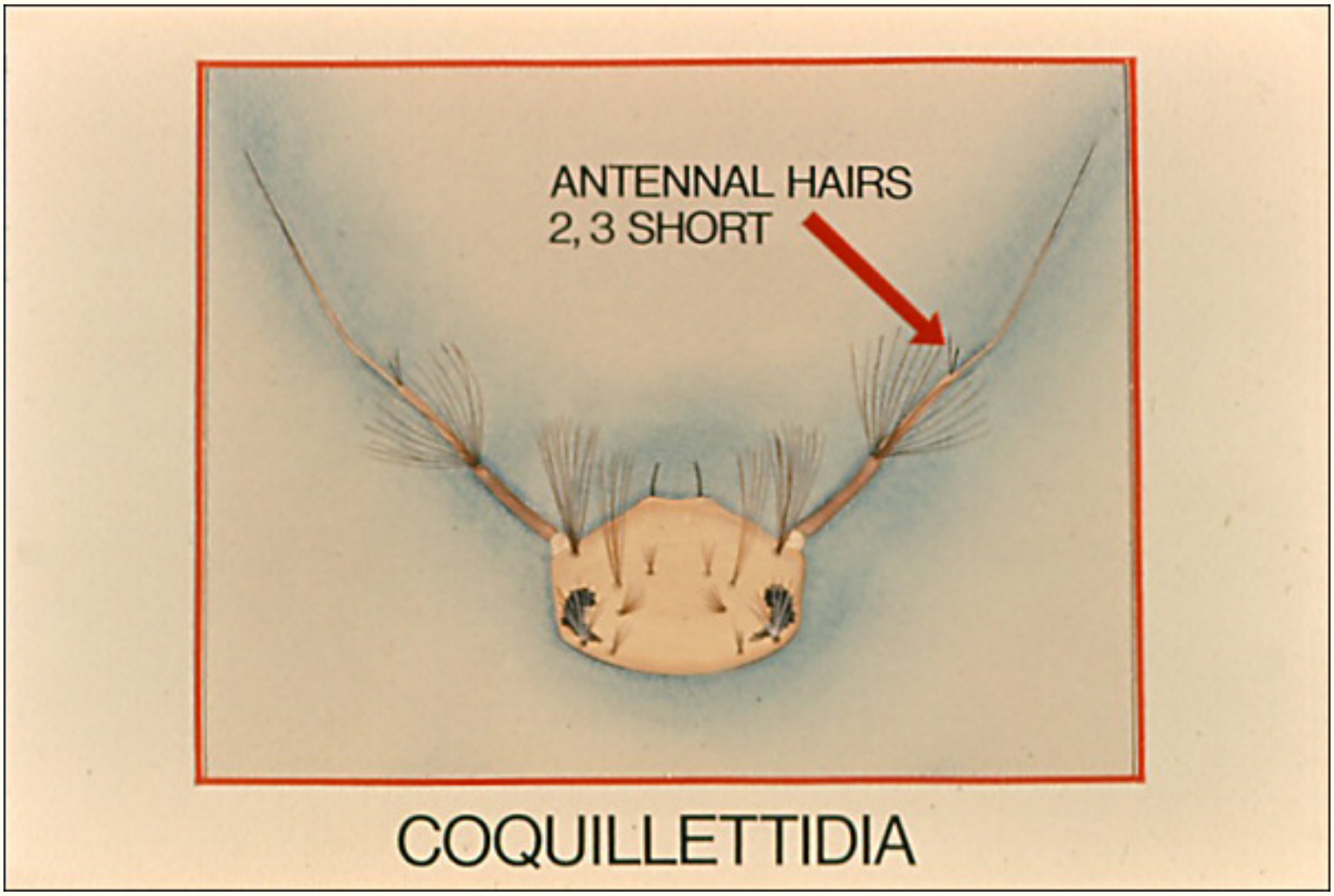

. . . and the short antennal hairs 2 and 3.

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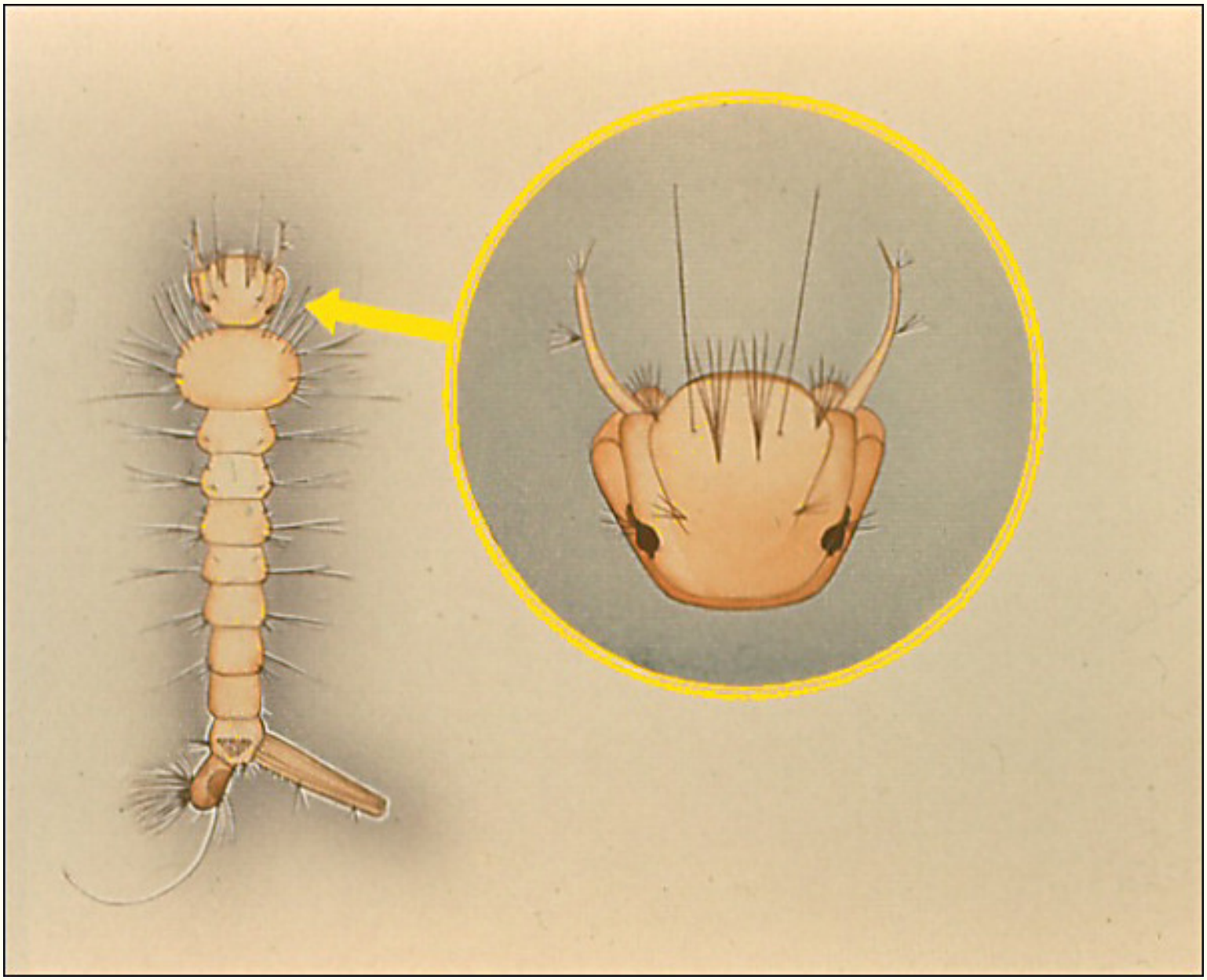

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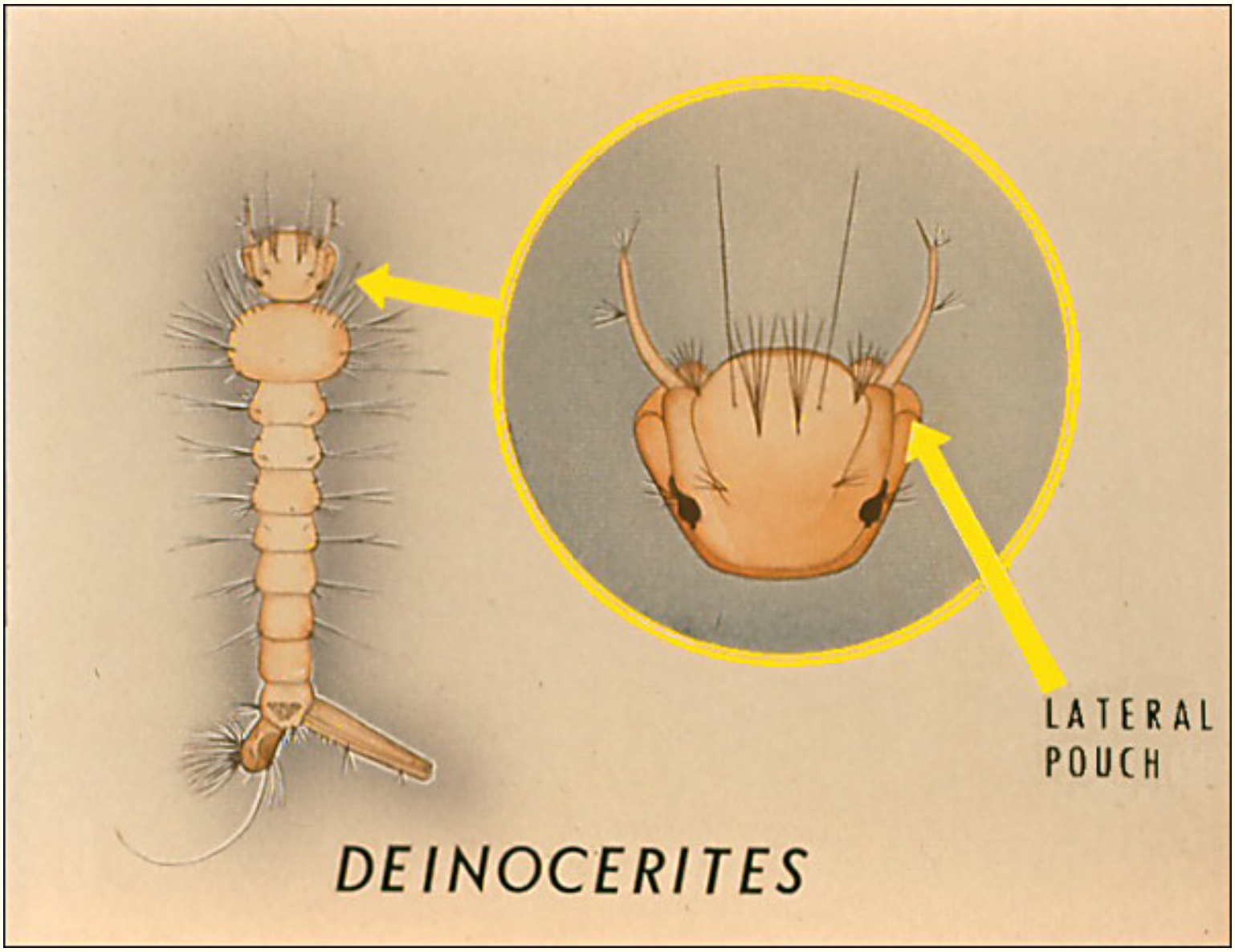

Deinocerites is distinguished by the prominent lateral pouches on the head.

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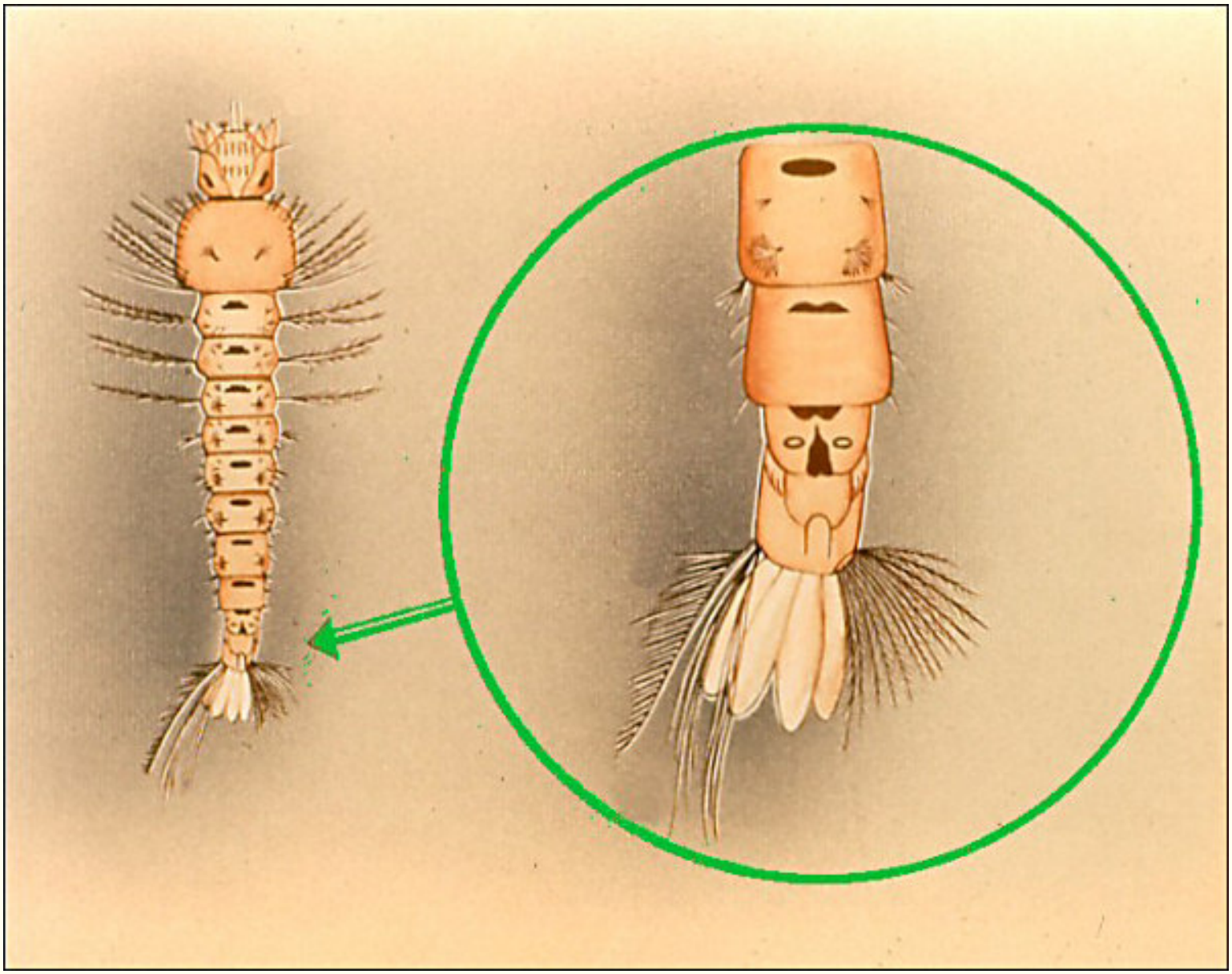

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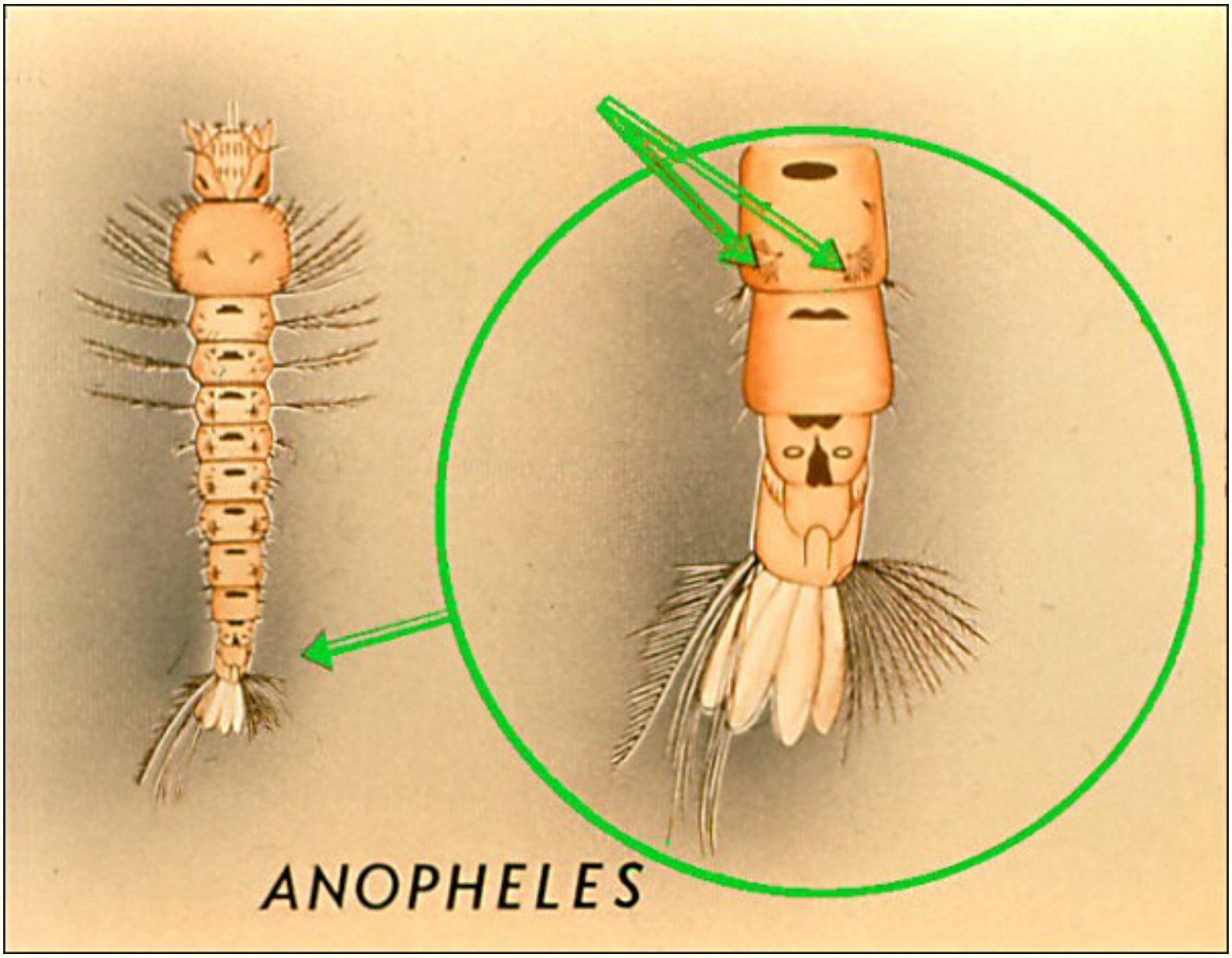

The important genus *Anopheles*, characterized by the absence of a siphon and the presence of palmate hairs.

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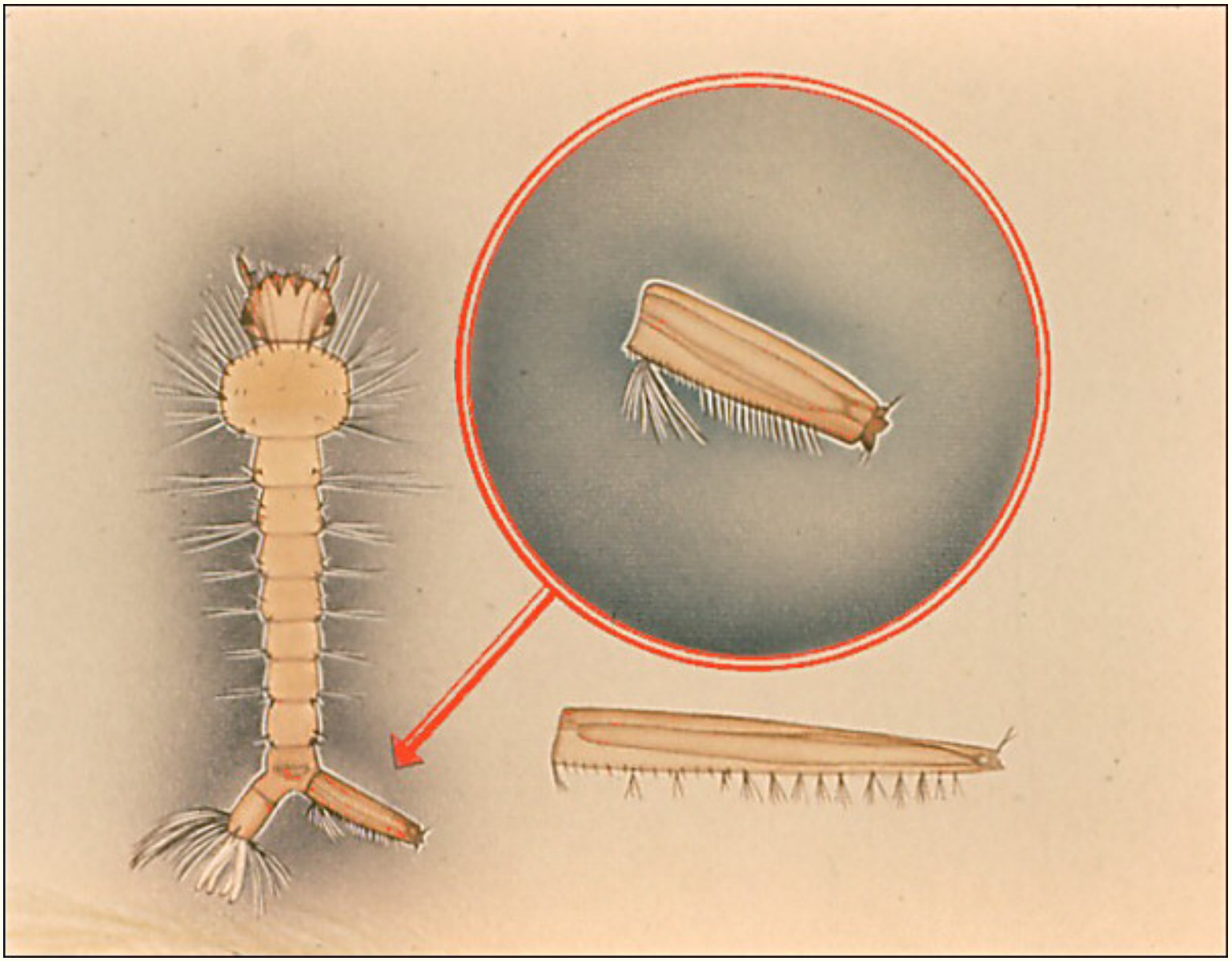

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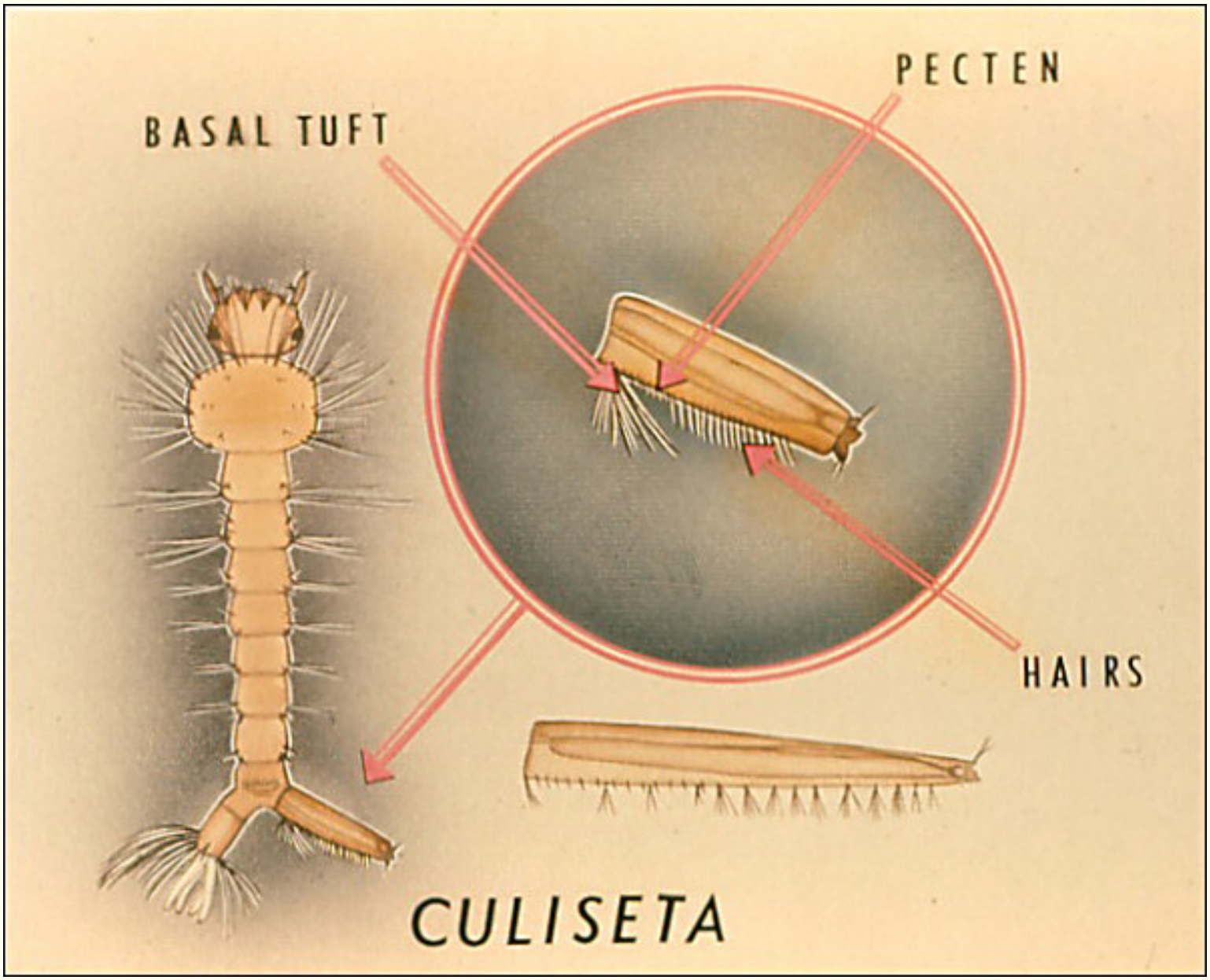

The basal tuft of hairs on the siphon and in most instances the row of hairs or tufts following the pecten are characteristic of *Culiseta*.

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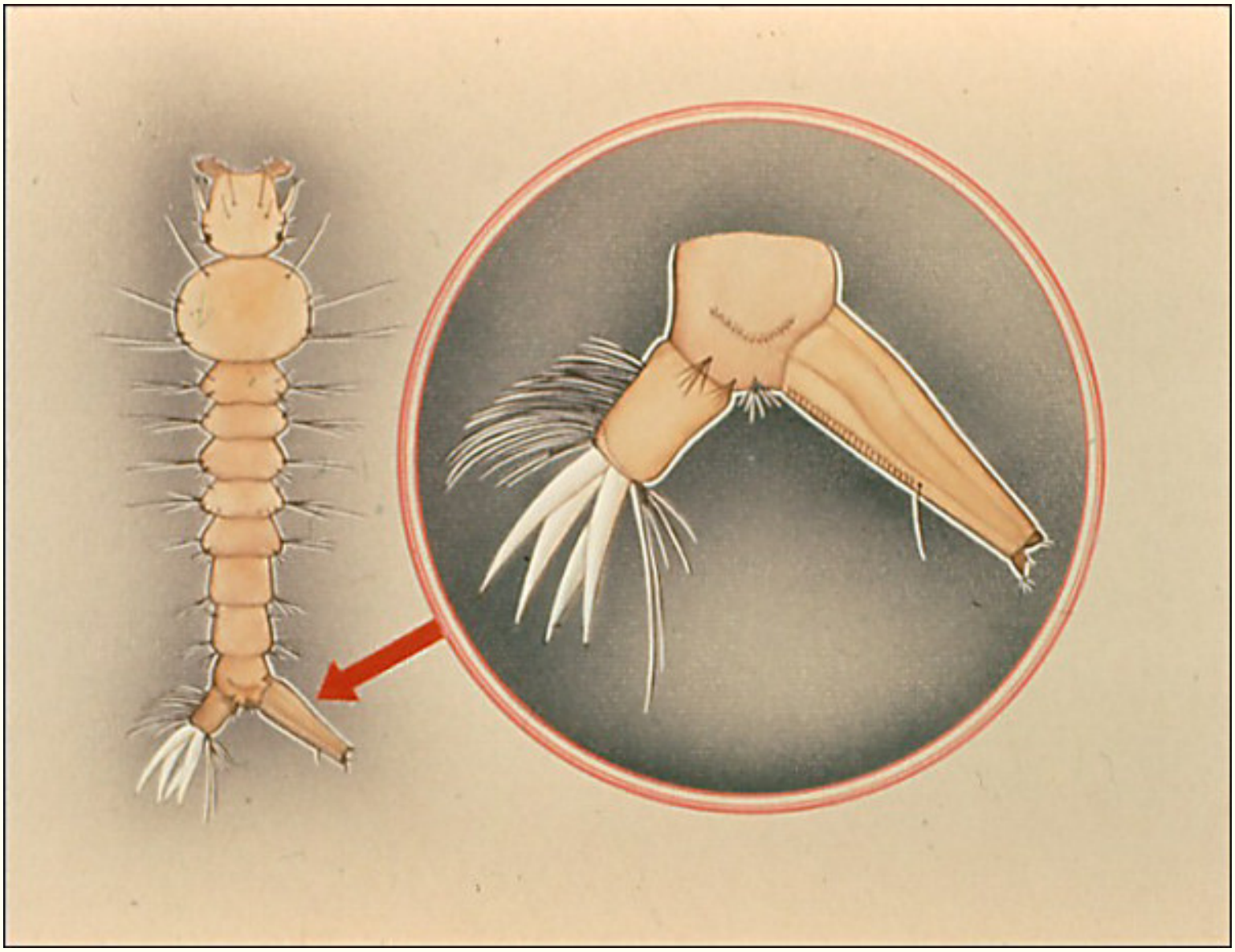

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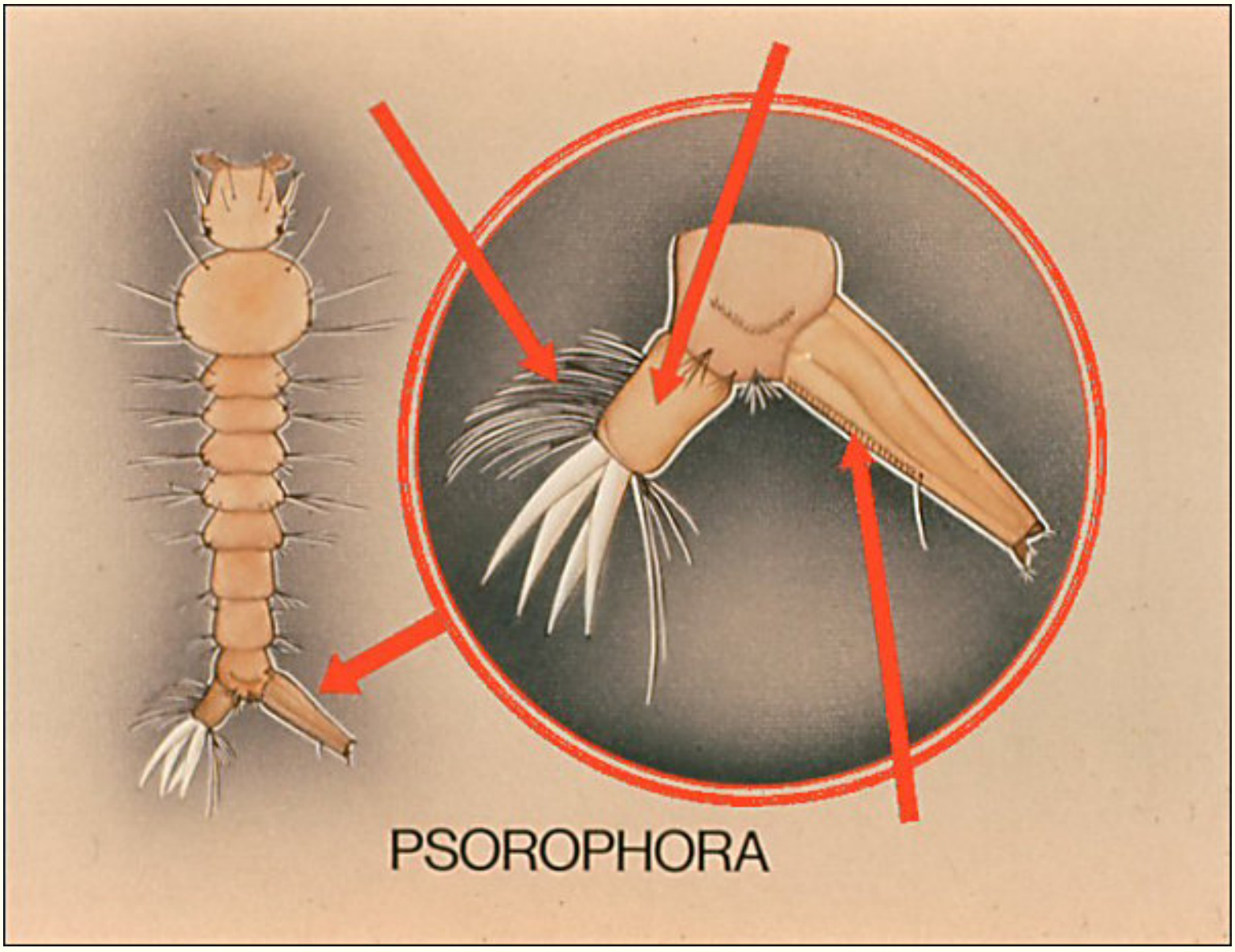

Psorophora, with pecten. Note that tufts of the median ventral brush are attached to the saddle plate, which completely encircles the tenth abdominal segment.

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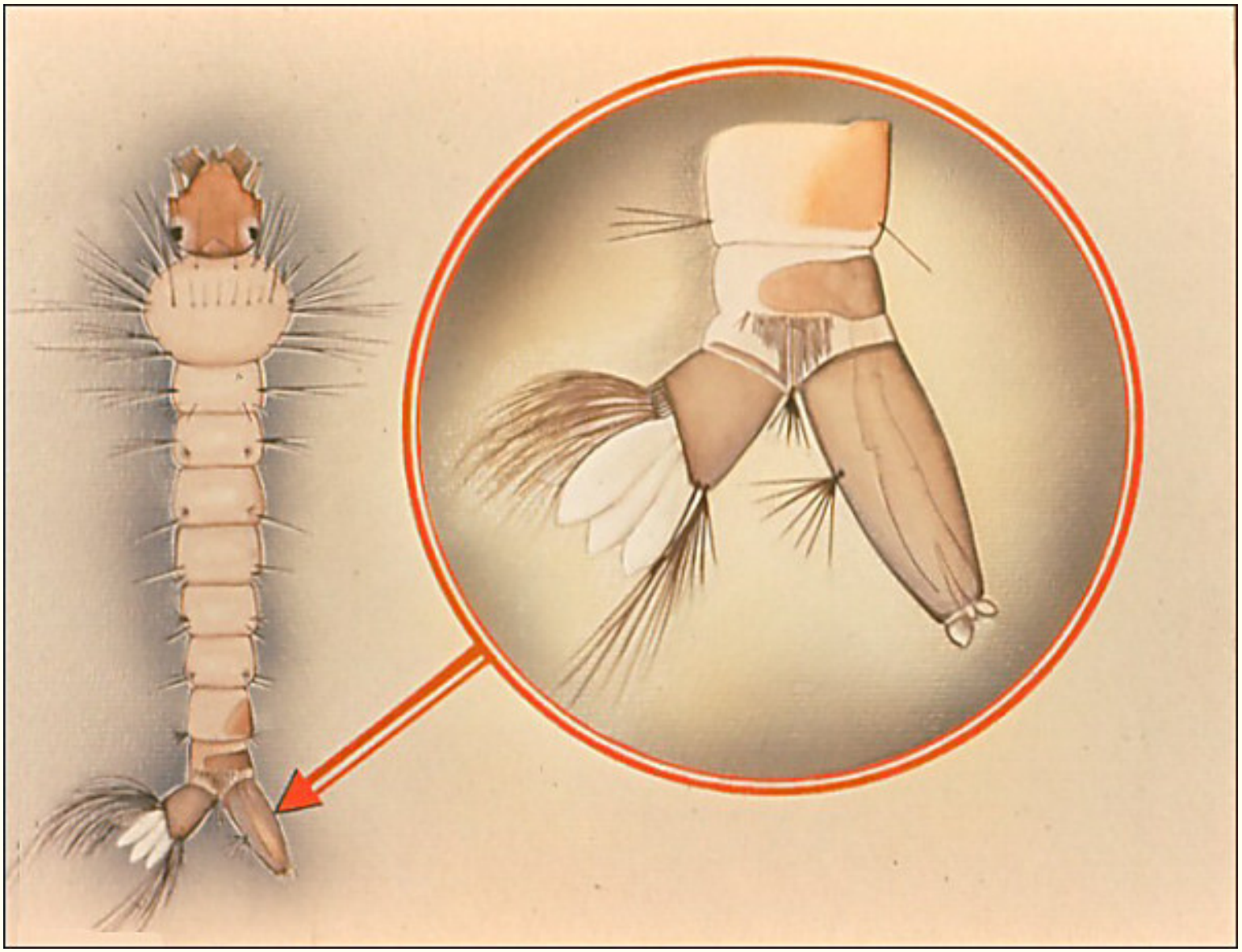

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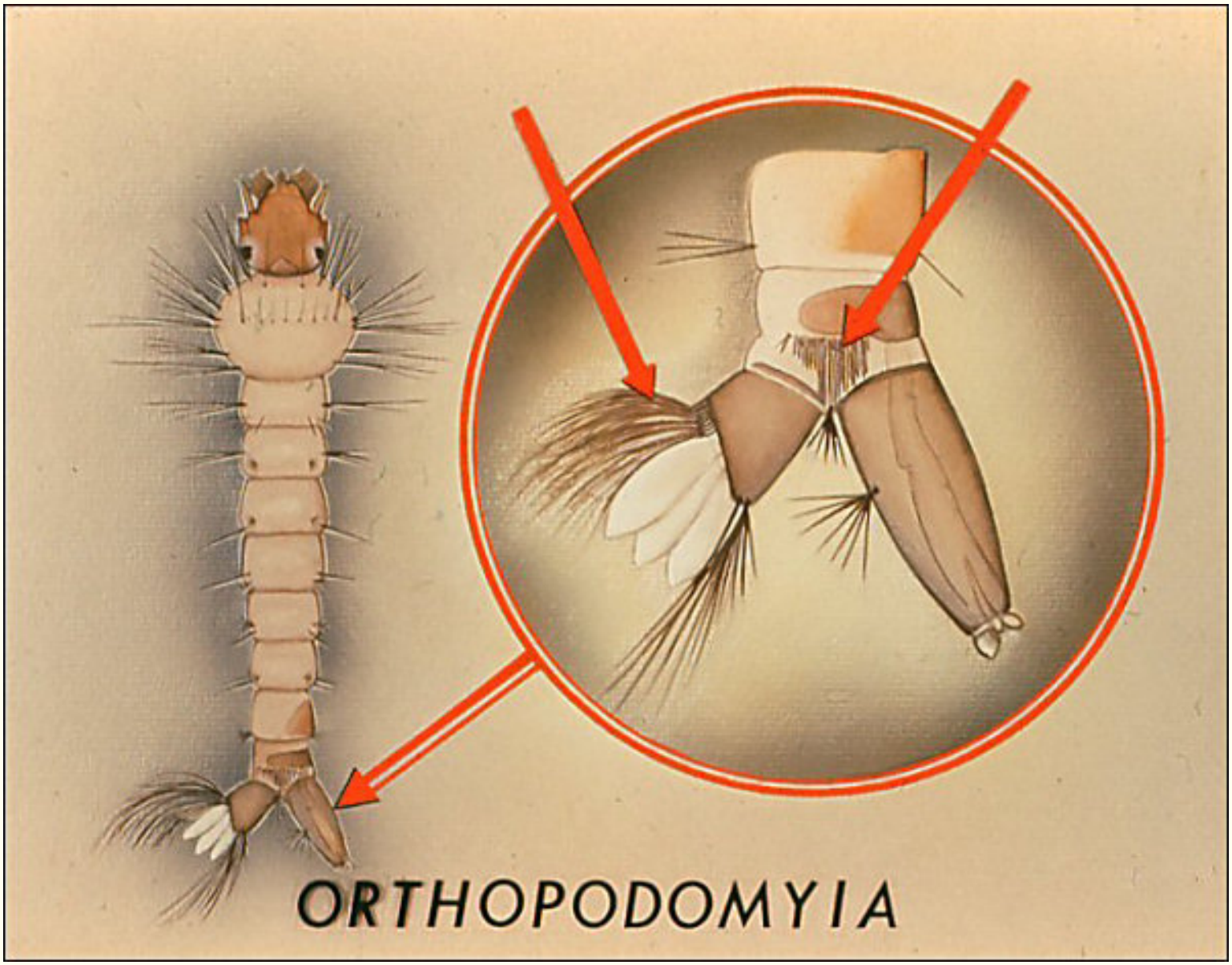

Orthopodomyia is distinguished by absence of a pecten and presence of a median ventral brush and comb scales.

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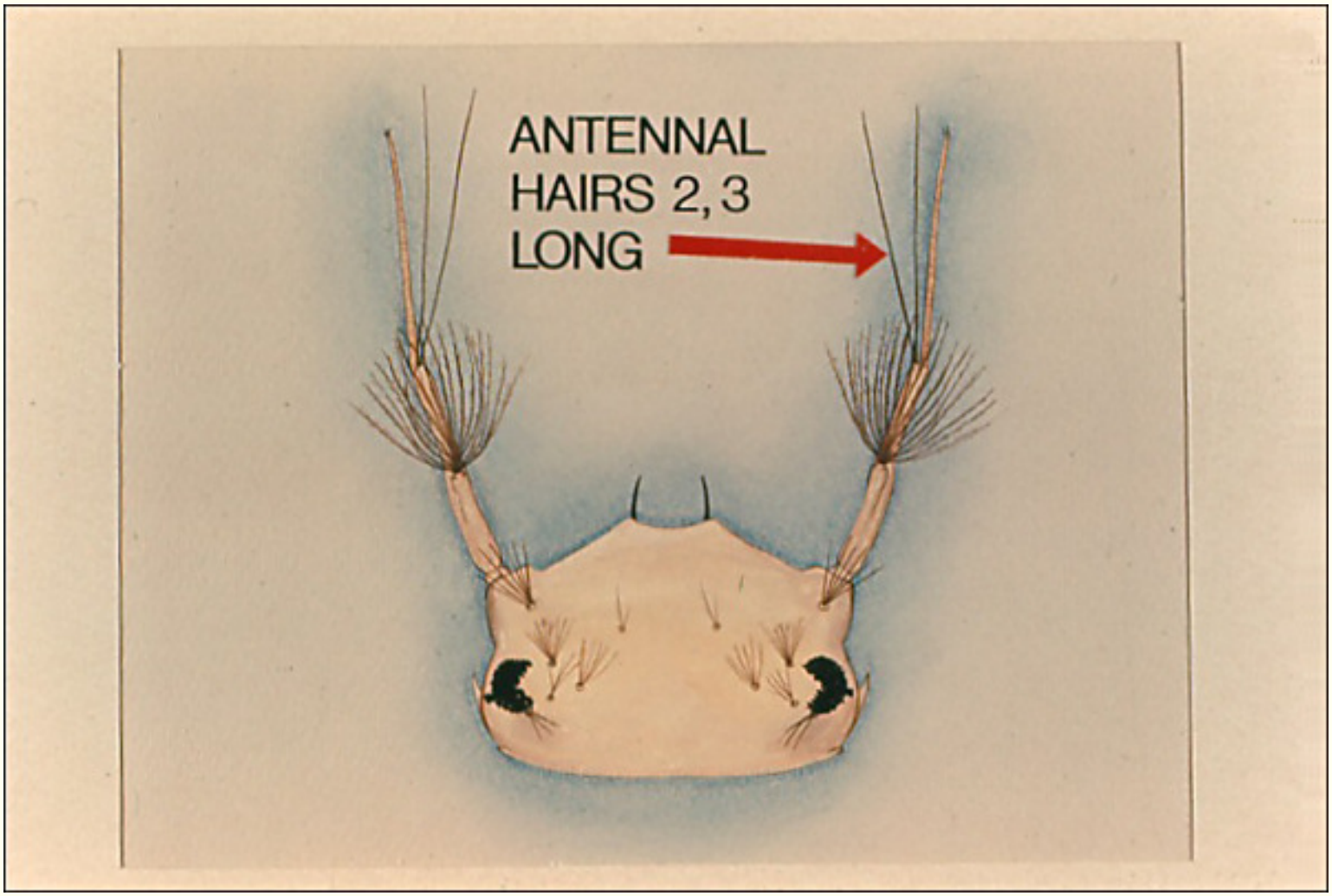

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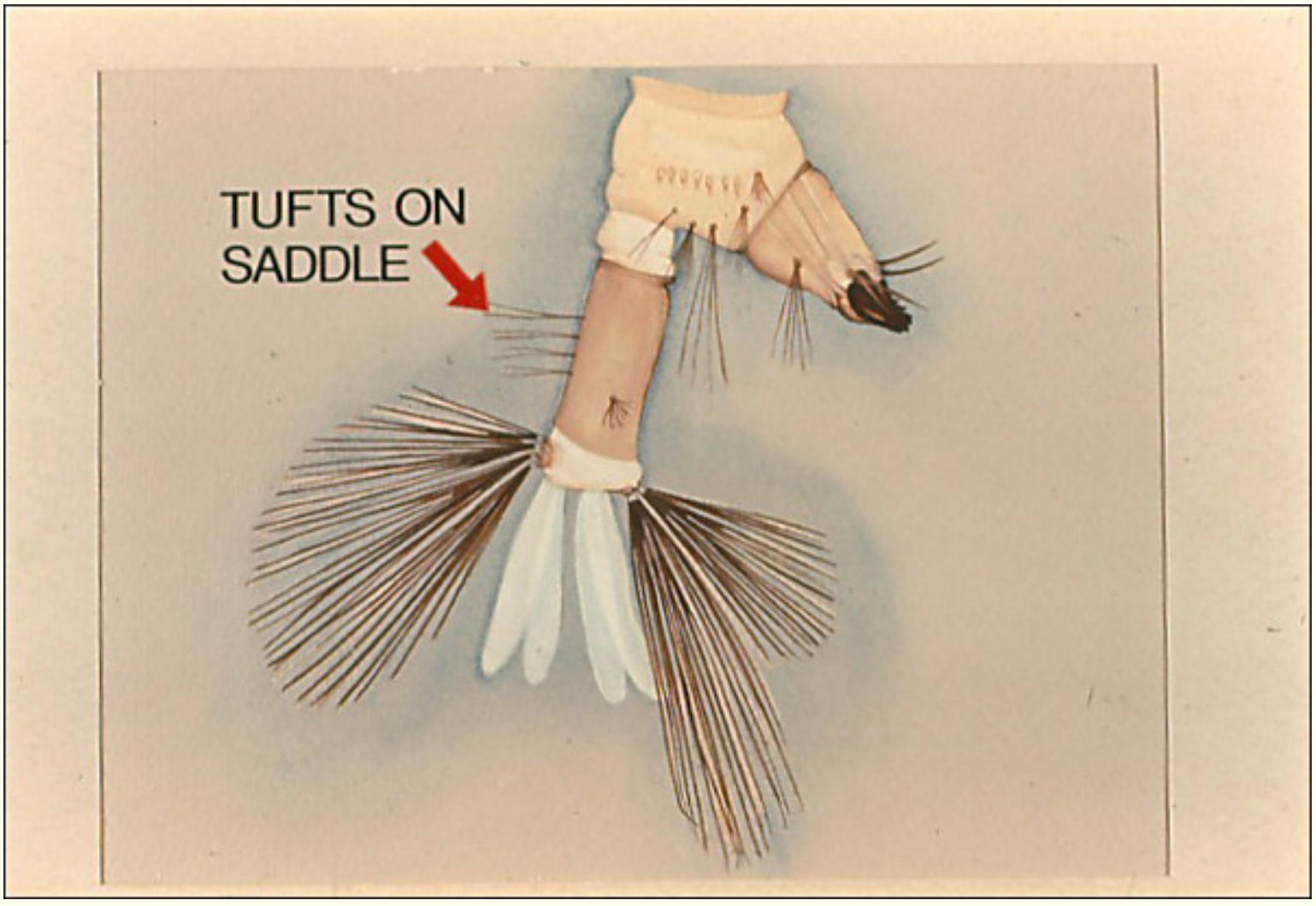

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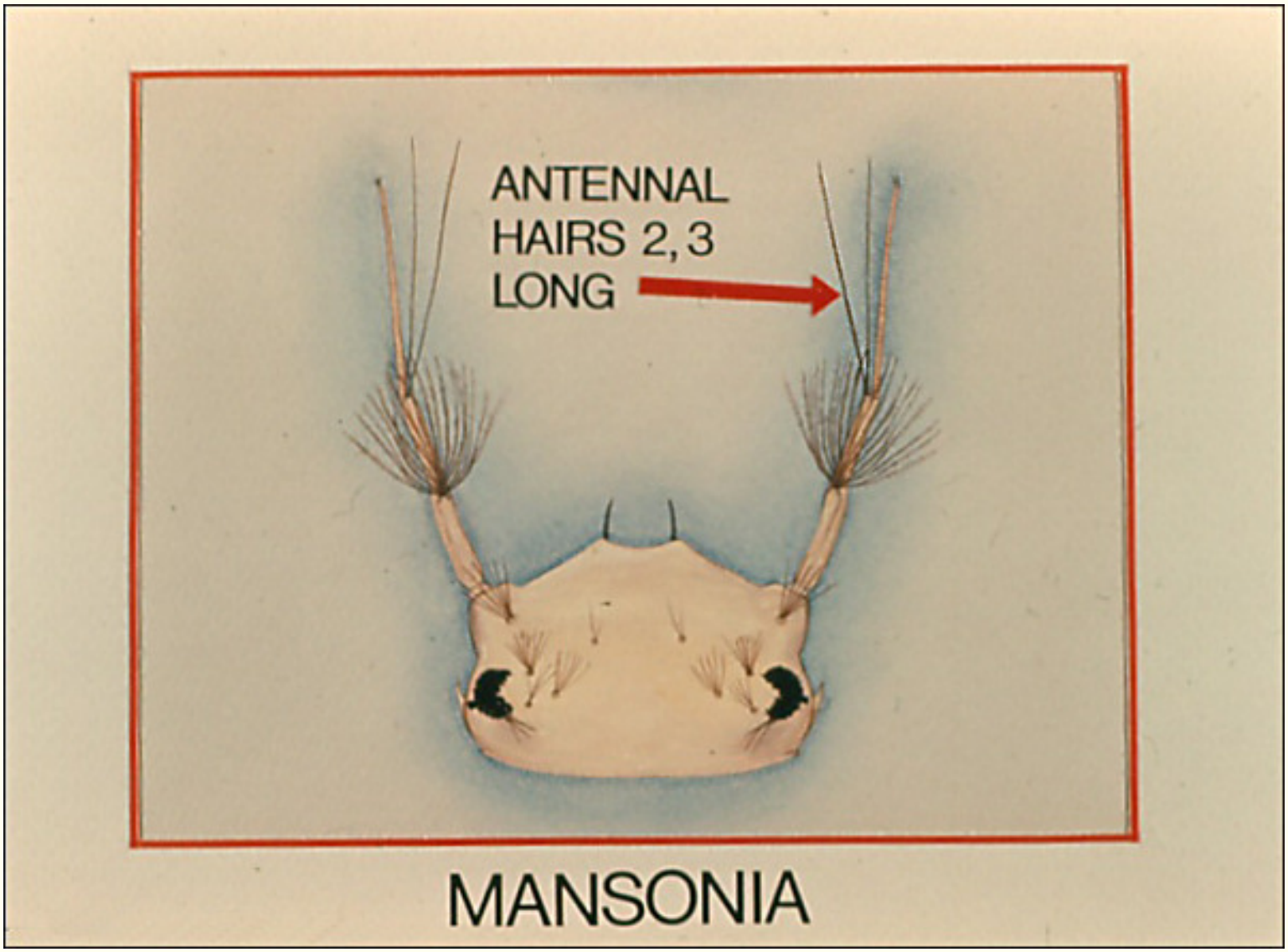

Mansonia is characterized by having very long antennal hairs 2 and 3 . . .

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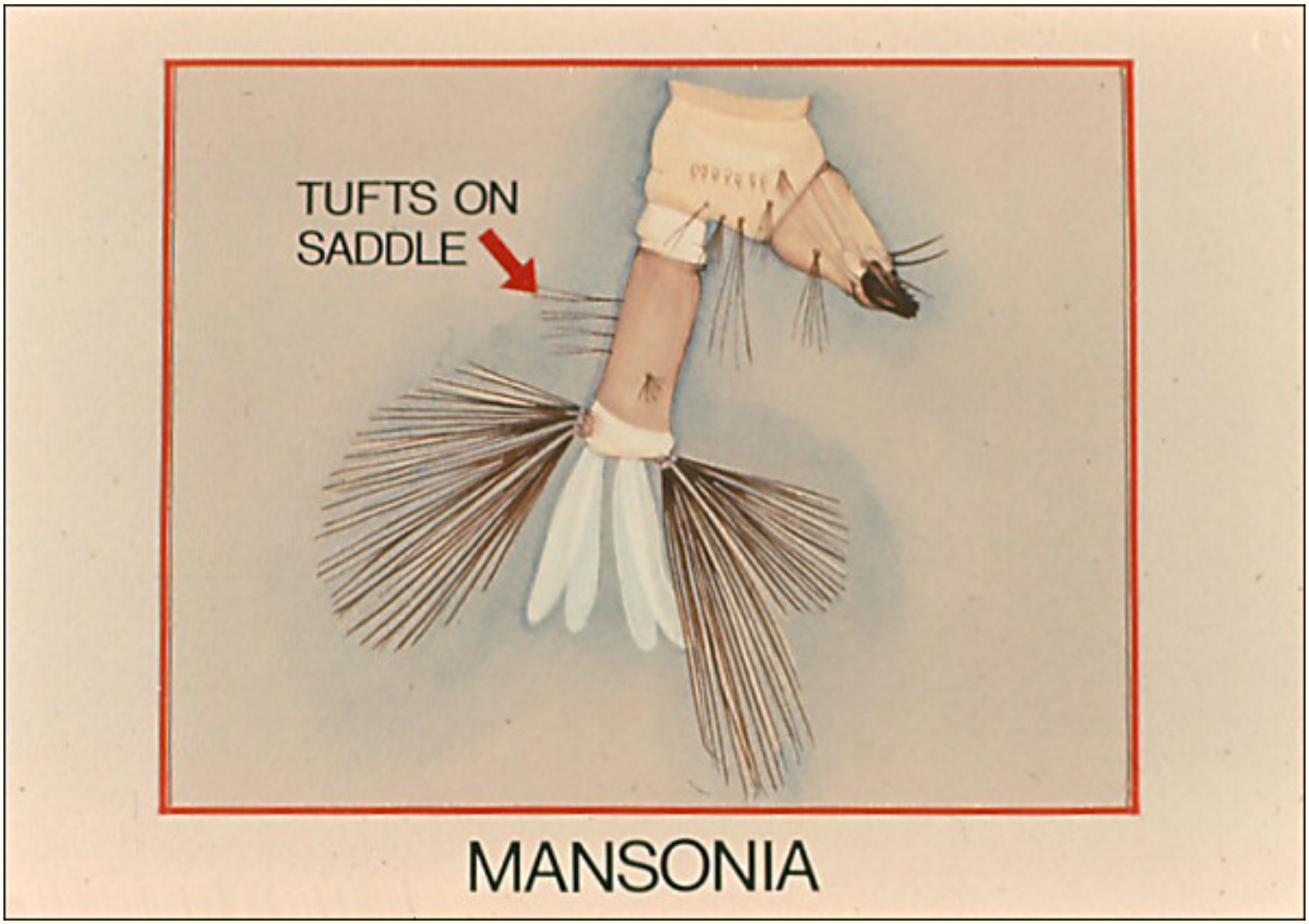

. . . and with prominent tufts on the ventral aspect of the saddle.

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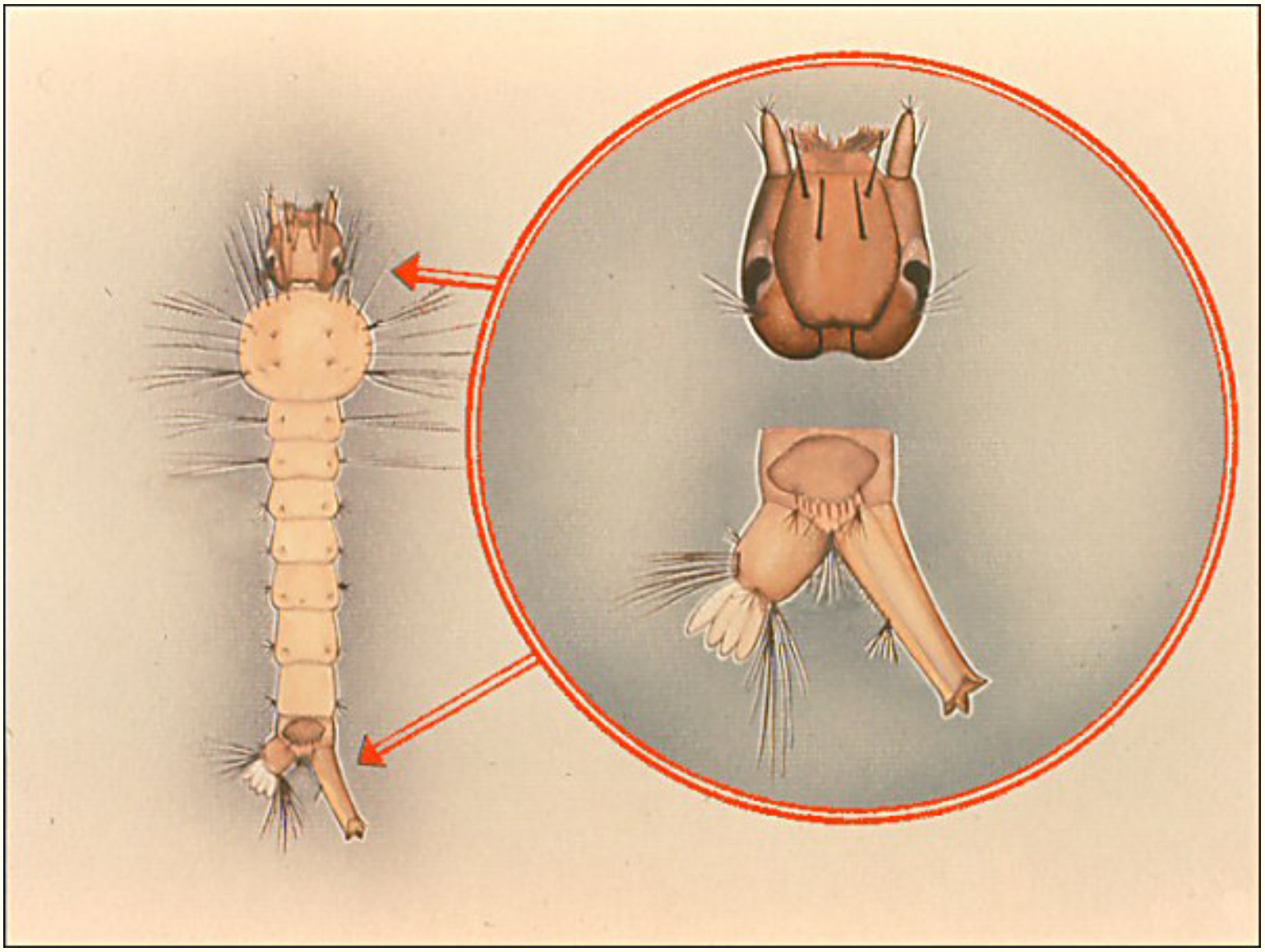

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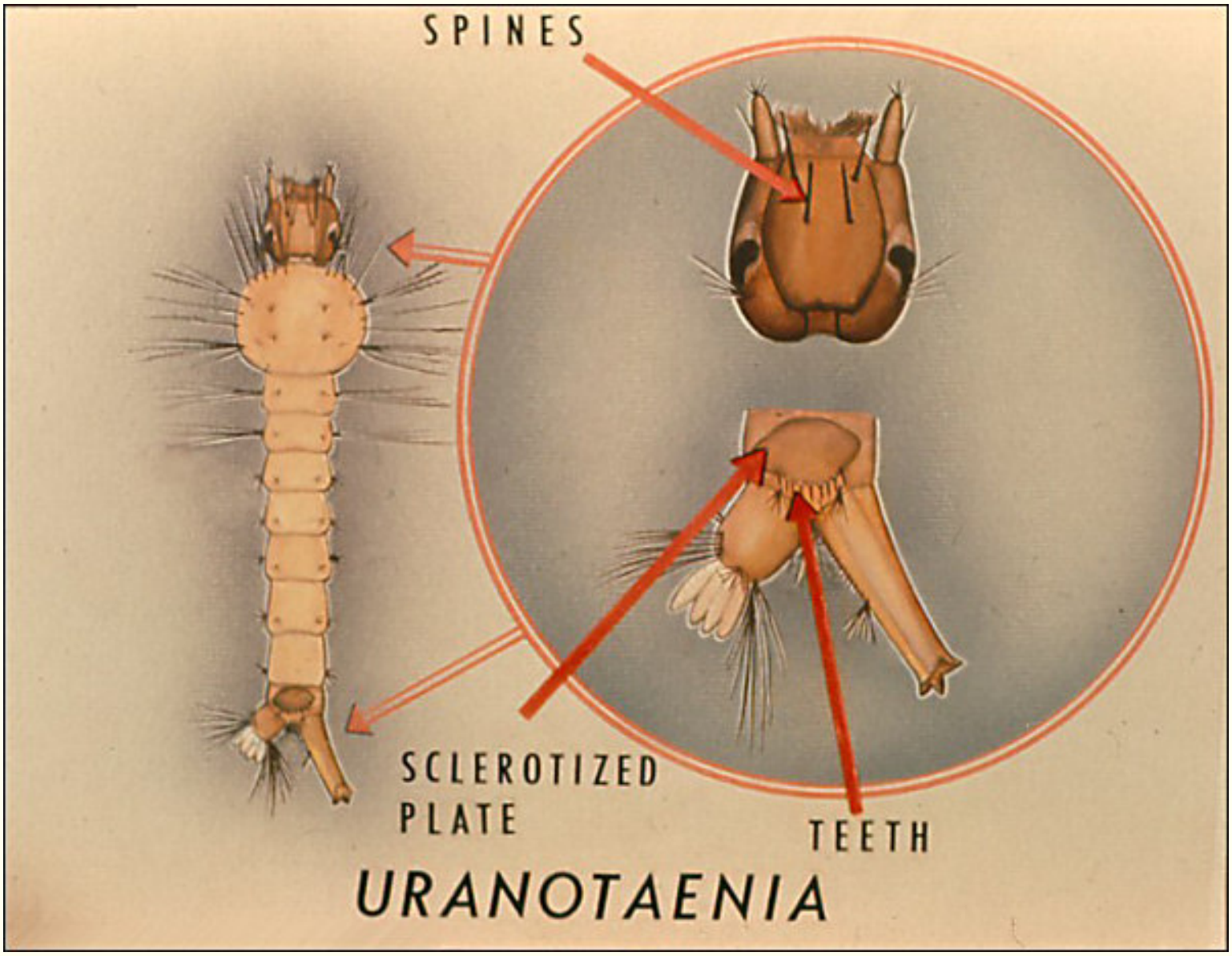

Uranotaenia has a pecten. It is easily distinguished from other members of the group by a row of teeth attached to a lateral plate on abdominal segment VIII. Note the stout spines on the head.

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Use this information to identify mounted specimens with the compound microscope on the right, or living larvae from the field, using the stereoscopic microscope and chemicals on the left to prepare temporary or permanent mounts. Remember, drawings are clear and obvious, but the characters on the actual mosquito larvae

may not be so easy to observe. Study each larva very carefully.

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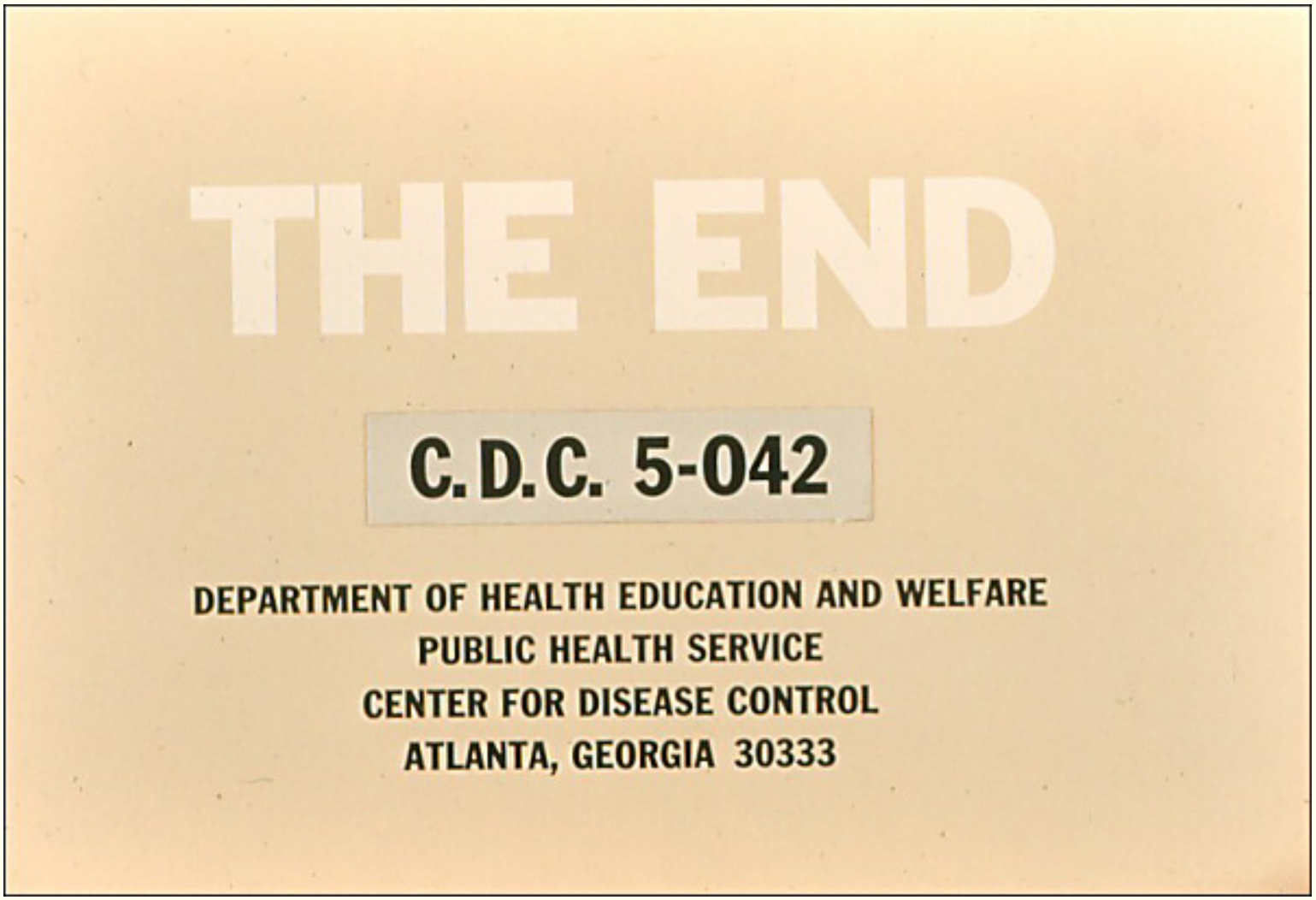

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