

Pediatric infections in daily living

Children may be exposed to non-lethal pathogens in daily life and living. Examples include: head louse infestation, *Trichophyton tonsurans* infection, *Streptococcus mutans*-provoked dental caries, acanthoamebic keratitis in contact lens wearers, *Demodex folliculorum* (acne mite) colonization in the hair follicle, and allergy against house dust mites.

Pediatric infections in daily living

- 1) Head lice (*Pediculus humanus capitis*)
- 2) *Trichophyton tonsurans*
- 3) *Streptococcus mutans*
- 4) *Acanthamoeba* and contact lens
- 5) *Demodex folliculorum*
- 6) House dust mites (*Dermatophagoides* spp.)
- 7) Pinworms (*Enterobius vermicularis*)

Head louse infestation



An egg of the head louse (*Pediculus humanus capitis*) laid on the hair.
The size of the egg is 0.8 mm.

Head lice and physical education (gym class)

The head lice are transmitted through mat exercise in a gym class.

Girls with long hair are susceptible to lice colonization.

The outbreak happens in the nursery and school

The infestation is unrelated to poor hygiene.

No restriction for school attendance is requested.

The head lice do not transmit any other infectious diseases.

The infestation is usually noticed by finding out 1 mm-sized eggs on the hair.

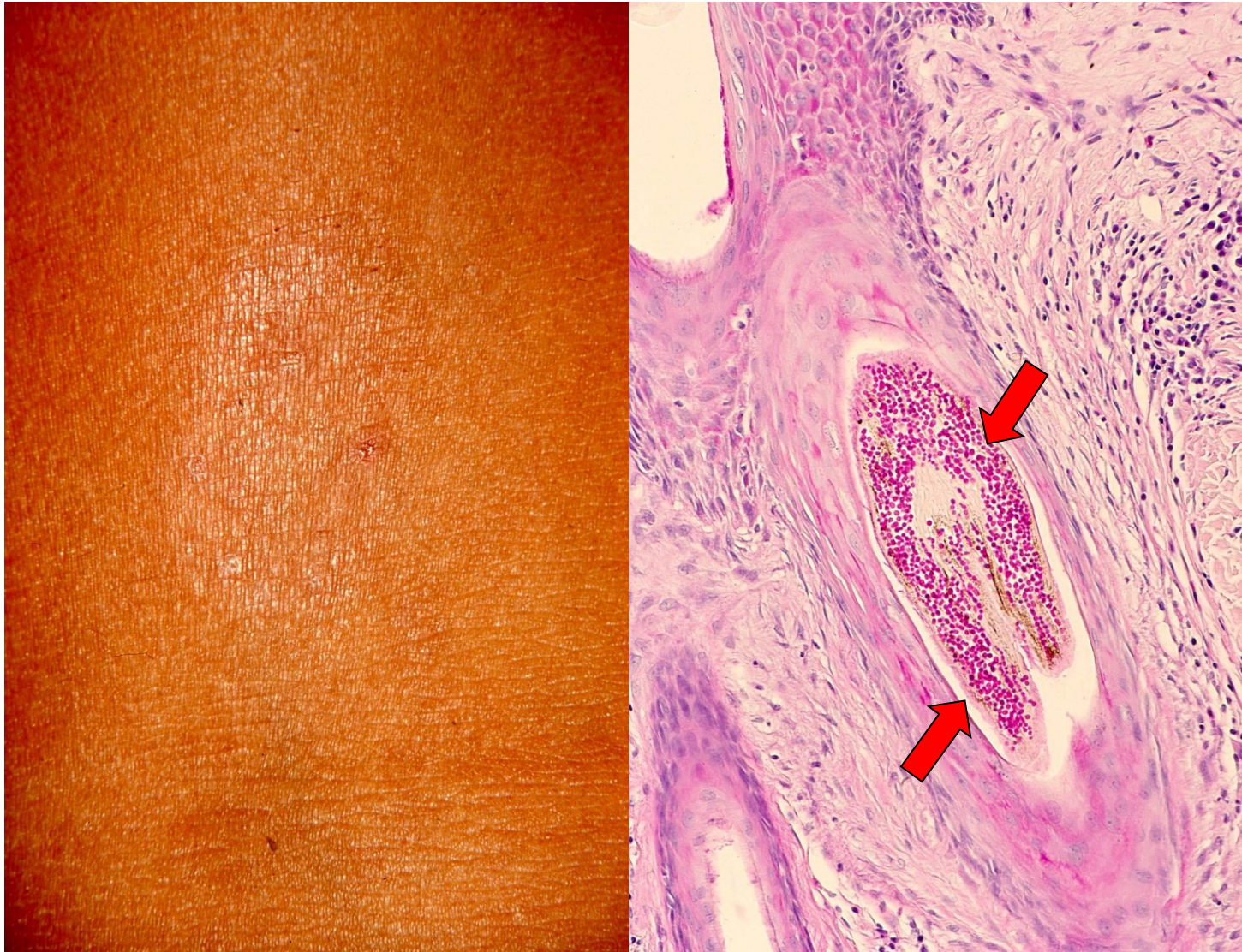
Larvae molt 3 times to become adult lice.

For the treatment, everyday shampooing and thinning out hair are needed.

Towels and bedclothes should be rinsed in warm water $>60^{\circ}\text{C}.$

Leave dolls or carpets to seal in a plastic bag for more than 2 weeks.

Trichophyton tonsurans infection to strong Judo players



Trichophyton tonsurans infection causes tinea corporis (left) and tinea capitis (right: PAS stain)

Trichophytosis tonsurans is common among strong Judo players

Trichophyton tonsurans is a novel imported fungus causing tinea (athlete's foot).

T. tonsurans infects scalp hair follicles to cause alopecia.

T. tonsurans causes annular erythema (tinea corporis) but without itching sensation.

T. tonsurans infection is common among strong players of Judo and Wrestling.

The stronger the Judo team is, the more chances of exercise and international matches happen.

Recently, Judo players of elementary school boys and girls get infection.

The younger players may have severe diseases.

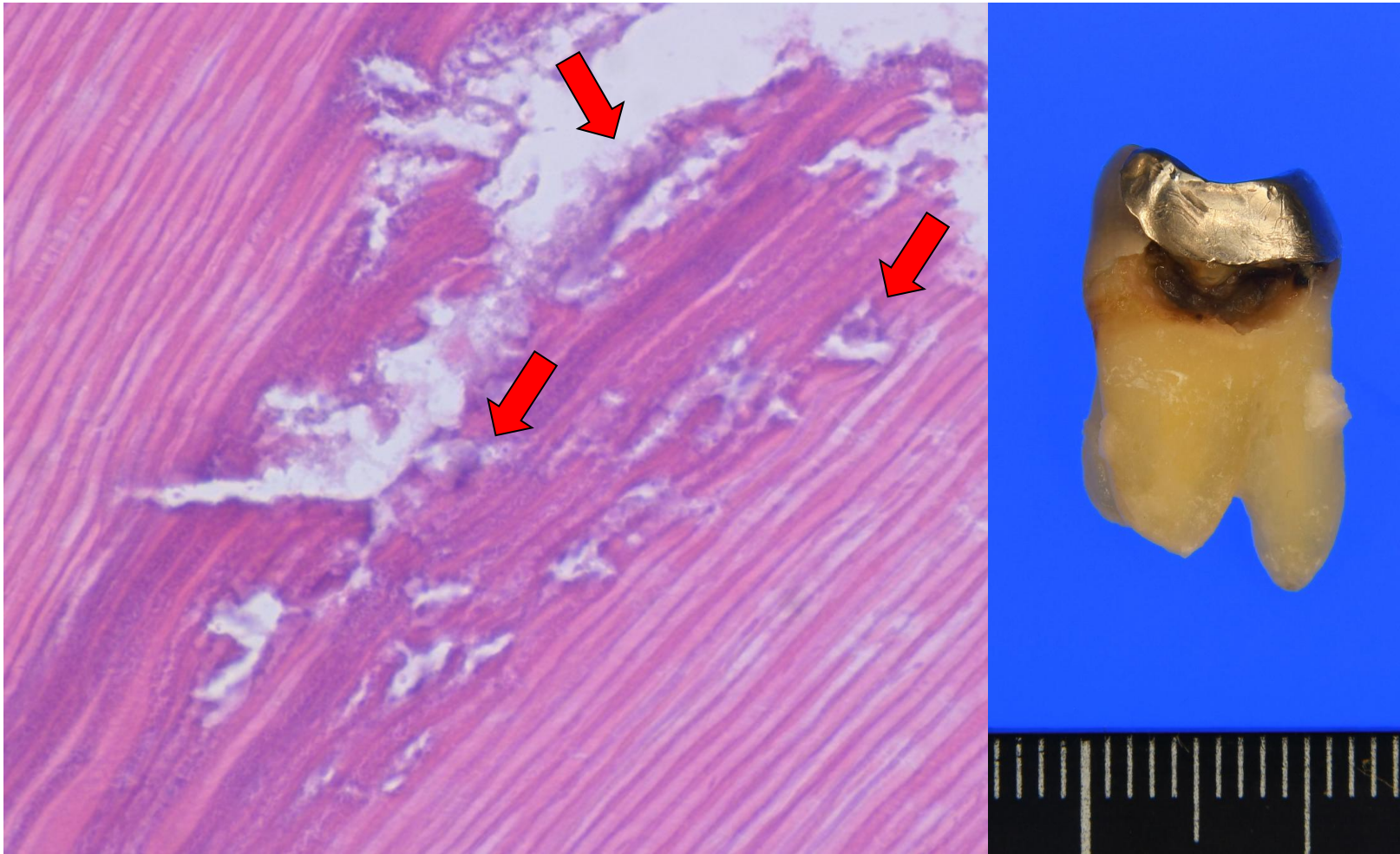
Group therapy is needed, because the strong players often live together as communal life.

Do not share hair brush.

Use shampoo with anti-fungal reagents.

Oral medication is needed to treat tinea capitis.

Dental caries and *Streptococcus mutans*

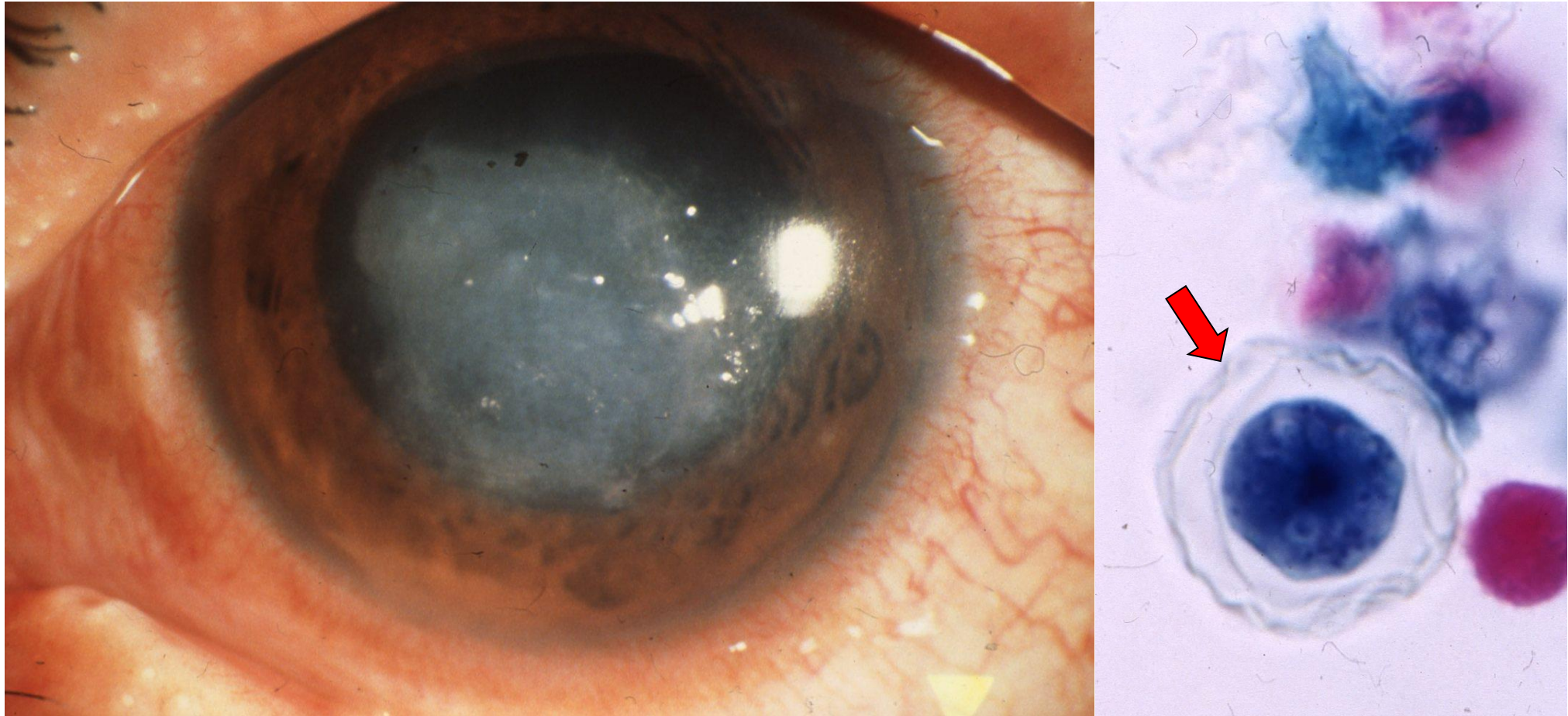


Along the decayed portion of the dental caries, colonization of Gram-positive cocci is seen (arrows).

Streptococcus mutans causing dental caries

Dental caries is caused by infection of *Streptococcus mutans*, an oral resident bacterium. Colonization of *S. mutans* is mediated by mouth-to-mouth feeding from the parent to child. *S. mutans* produces viscous glucans from the sugar (sucrose). Within the plaque, *S. mutans* secretes lactic acid to decay enamels and dentins. Tooth dents and grooves, the root of the tooth and the space between the teeth are involved. The site around the tooth filling is susceptible to dental caries. Decrease of saliva is closely related to tooth decay. Tooth brushing is aimed at the removal of dental plaques. The use of dental floss and interdental brush is effective for preventing tooth decay. On the dental caries, *Lactobacillus* co-proliferates with *S. mutans*.

The contaminated contact lens causes keratitis



Acanthamoebic keratitis caused by infection of *Acanthamoeba* spp. is seen in contact lens wearers. Acanthamoeba are ubiquitous, free-living protozoa, present in soil, dust, drinking water and also sea water. The cyst (Papanicolaou stain in the right panel) is resistant to disinfection. The infection occurs through the protozoan contamination in the lens-rinsing solution.

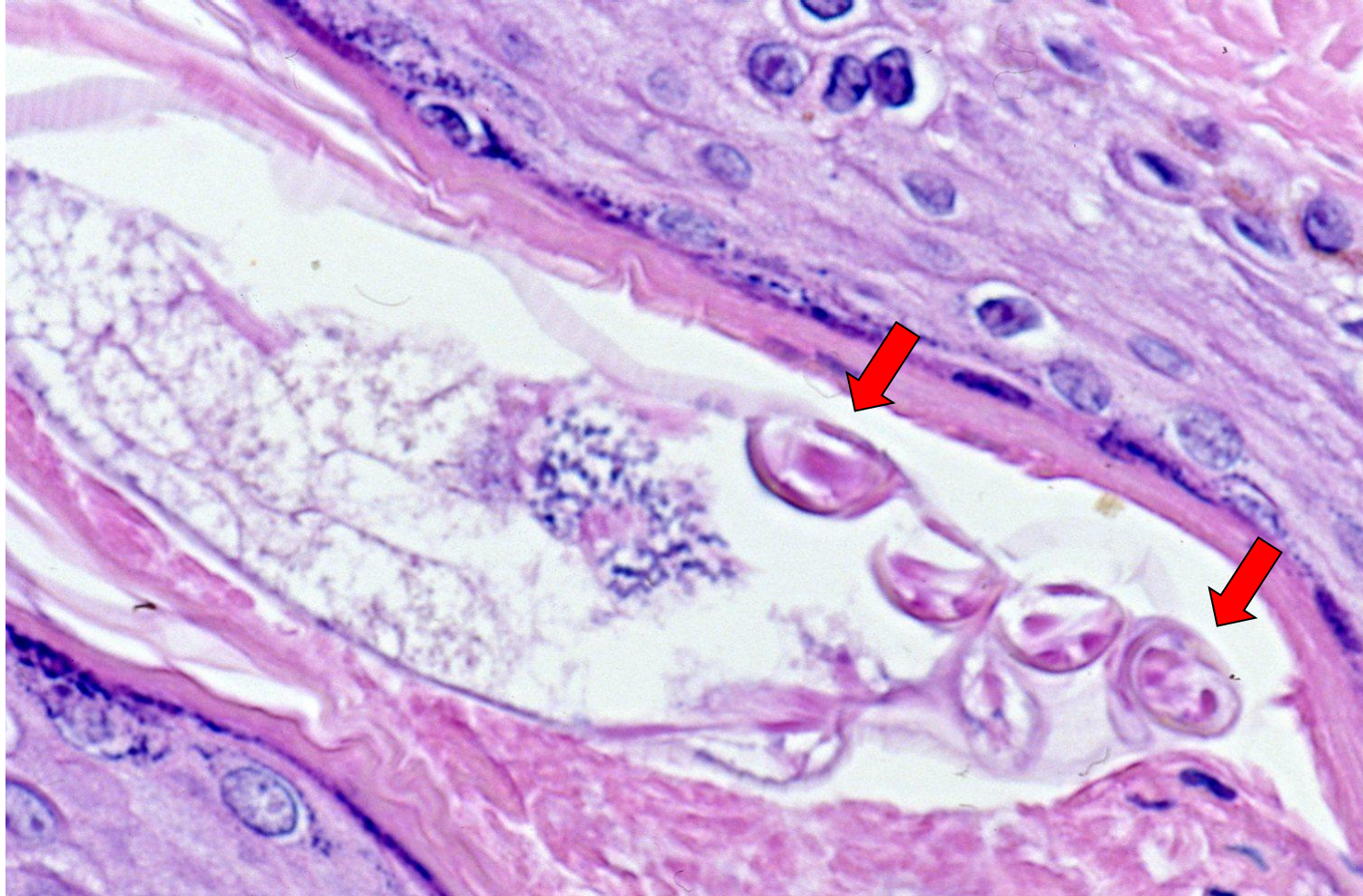
How to use contact lenses

A young female student complained of uncomfortable feeling in her left eye. She has used disposable-type soft contact lens repeatedly. The diagnosis made was acanthamoebic keratitis. Acanthamoebic keratitis tends to occur in the adolescence and young adults.

Acanthamoeba are a free-living protozoa widely distributed in the nature. Acanthamoeba live in the river, swimming pool, wet soil, sands in the park and washroom. Acanthamoeba grow in the storage solution for keeping contact lenses.

Keep the correct way of using contact lenses.
Avoid wearing for a long time, and do not wear during sleep.
The used lenses should be rinsed with water, dried and then preserved in the storage solution.
The lenses should be rinsed with soap.
Do not add new storage solution to the old one.
The contact lenses in the storage solution should be rinsed with water and then be worn.

Demodex folliculorum (so-called acne mites) in the hair follicle



An adult mite (*Demodex folliculorum*) in the hair follicle on the face (H&E). Arrows indicate four pairs of legs of the acne mite.

Acne mites (*Demodex folliculorum*)

Acne mites (*Demodex folliculorum*) are small mites living in the hair follicle on the seborrheic skin, such as the face, eye lids and external meatus.

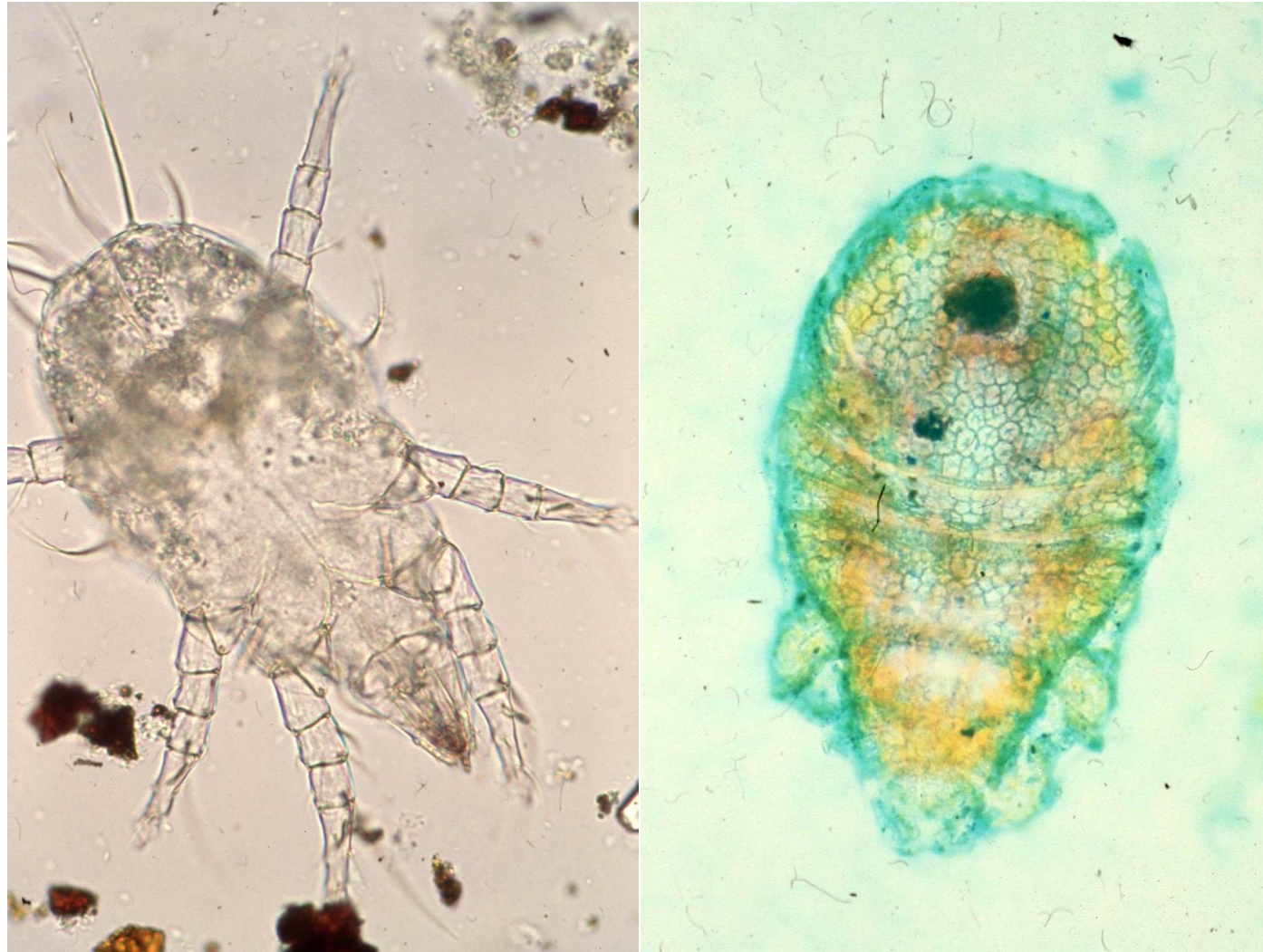
Secondary infection of *Propionibacterium acnes* results in manifestation of acne (pimples).

The rate of colonization of *Demodex folliculorum* in adults is 100%.

Colonization of acne mites itself does not cause acne.

Colonization may happen, when parents rub their face against the baby face.

House dust mites (*Dermatophagoides*)



A larval mite with three-paired legs in the urine (left, unstained preparation) and an adult mite with four-paired legs on the cytology preparation (right, Papanicolaou stain).

House dust mites, pancakes and mite allergy

House dust mites (*Dermatophagoides*) are invisible 0.2-0.4 mm-sized tiny mites. House dust mites live in the house dust, carpet and bedding. House dust mites do not infests the human.

Pancake mix can easily be contaminated with house dust mites!

House dust mites ridiculously grow in the pancake mix powder rich in nutrients, when kept at room temperature. After opening, the powder should be kept in the refrigerator, and must be used up, as soon as possible.

Pancakes rich in house dust mites may provoke mite allergy.

Pinworm (*Enterobius vermicularis*)



A pinworm about 10 mm in size was incidentally identified on the vulva of a 4-year-old girl. The female adult of *Enterobius vermicularis* contains numerous embryonated eggs, ellipsoid in shape and 50 μm in length.

Infestation of pinworms

The pinworm (*Enterobius vermicularis*) is a nematode, white, thin and 10 mm-long.
The adult female pinworms reside in the cecum, and lay eggs on the anus in the night time.
The eggs become infective 6 hours after spawning.
The spawning stimulates itchy sensation of the anus.
The eggs attached to the fingers mediate autoinfection as well as an endemic in the family.
Anti-helminthic medicine should be taken by all the family members.
Washing of the towels and bedding materials is important for preventing infestation.

The rate of pinworm infestation in Japanese children is below 1%.
The pinworm test using a tape dispenser (adhesive tape) was abolished in 2016 in Japan.

Infrequently, infestation of adult *E. vermicularis* in the cecum causes acute appendicitis.