Answer to Photo Quiz: Crusted Scabies

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This patient had crusted scabies (CS). CS is caused by hyperinfestation by the mite *Sarcoptes scabiei*. CS was scientifically described in 1848 by Norwegian physicians Daniel Danielssen and Carl Boeck, who believed it to be a form of leprosy (1). It was described again in an 1852 paper by Ferdinand Hebra, who called it “scabies norvegica Boeckii,” or “Boeck’s Norwegian scabies,” by which name (minus the eponym) it is still commonly known. “Crusted scabies” is the preferred name, however, given that the disease occurs worldwide and has been known since antiquity (2) and because this name is both more clinically descriptive and less epidemiologically misleading.

Typical scabies infestations involve < 20 mites and cause a pruritic rash generally restricted to the interdigital, inframammary, axillary, and groin regions. In contrast, CS involves millions of mites proliferating in the skin of a single individual, causing extensive hyperkeratotic scaling (“crusts”) obscuring skin tone and mite burrows and curiously variable (including none) but often intense pruritis (3). Thousands of mites are shed daily, making the condition highly contagious.

The largest case series of patients with CS found that 58% had potential risk factors for immunosuppression; conversely, 42% did not. Risk factors included type 2 diabetes, malnutrition, cirrhosis, end-stage renal disease, autoimmune disease, chronic infectious diseases, and hematologic malignancies (4). CS has also been reported in association with leprosy (which helps explain its original identification as that disease by Danielssen and Boeck), human immunodeficiency virus (HIV), human T-lymphotropic virus type 1, adult T-cell leukemia/lymphoma, epidermolysis bullosa, IgA deficiency, Langerhans cell histiocytosis, neutropenia, myelodysplasia, pregnancy, and treatment with immunosuppressive agents such as corticosteroids, mycophenolate mofetil, and infliximab (5). CS typically develops over months, as mites multiply and colonize adjacent areas of skin. Diagnosis is often delayed, in some cases by many years, because of lack of clinical experience with this variant of scabies and confusion with more-common skin conditions such as eczema (6).

The specimen was a saline wet mount preparation of skin scrapings. Four separate wet mounts were prepared, each from a different site of the body, in the following manner. A drop of nonbacteriostatic saline was placed on a microscopic slide, skin scrapings were obtained using a surgical blade to abrade the crusts away and sample underlying healthy skin, and the blade was touched to the drop of saline to elute the scrapings into it. A coverslip was then applied, and the specimen was immediately brought to the clinical laboratory. The preparations were scanned using usual light microscopy with an Olympus BX-46 microscope at ×100 magnification (10× ocular, 10× lens). Numerous fragments of skin containing scybala and eggs were observed on each slide preparation. Examination under 20× and 40× lenses (×200 and ×400 total magnifications) permitted visualization of more detail. Photomicrographs and videos were obtained with an Olympus DP73 microscope digital camera mounted onto the microscope, using an adapter to link to a portable computer (Dell Optiplex 7010; Windows 7 operating system) hosting the Olympus CellSens Entry 1.15 (build 14760) program.

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FIG 1 (A) *Sarcoptes scabiei* mite, dorsal view ($\times 100$ total magnification). (B) *Sarcoptes scabiei* mite, ventral view ($\times 200$ total magnification). See text for explanation of abbreviations. A video ($\times 200$ magnification) of a motile scabies mite with movement hindered by an air bubble occupying the right side of the viewing field is viewable at <https://youtu.be/UbKm5cXxwF0>.

The digital image was sent to DPDx, a diagnostic service offered by the Centers for Disease Control and Prevention (CDC). DPDx confirmed the detection of *Sarcoptes scabiei*, commented on the various stages of development of the eggs, and noted that scybala (mite fecal pellets) are “circumstantially diagnostic even if no mites are observed” (7; <https://www.cdc.gov/dpdx/dxassistance.html>).

A subsequent and more leisurely microscopic examination revealed approximately two to four adult mites (with eight legs) or nymphs (with six legs) on each slide preparation (Fig. 1). (The adult male or female mite is 0.2 to 0.25 mm or 0.30 to 0.45 mm in length, respectively [8].) Characteristic mite anatomic structures included the chelicerae (Ch) (paired toothed [chela] mouth parts), four segmented legs (L) (two on each side of the Ch; arrows point to the two on the right), the gnathostoma (Gn) (an anterior tube through which food is carried and to which the mouth parts are attached), notogastric spines (NS) (rod-shaped structures), notothoracic cones (NC) (acorn-shaped structures; six in total, one circled), dorsal dens (DD) (chitinous, triangular structures located on the dorsal surface), an internal developing egg (E), and the anus (An) (9).

Incubation of skin scrapings in saline and microscopic examination of a wet mount have been proposed as a simple diagnostic tool (10). We did not incubate as directed by this protocol, instead placing the skin scrapings directly on a drop of saline on a microscope slide, adding a coverslip, and immediately examining microscopically. Whether examination is immediate or delayed following incubation, saline wet mount preparation appears to preserve mite viability and motility, greatly aiding detection and identification.

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