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we did not specifically define the individual curricular topics that might fall under the heading of wilderness medicine. Wilderness medicine is a broad field, and it is possible that some misclassification of included or excluded content by respondents may have occurred. Finally, there may have been an element of selection bias, in that directors of programs that include wilderness medicine curricular content may have been more likely to complete the survey.

In conclusion, wilderness medicine curricular content is now available within most emergency medicine residency program curricula, with 44% of programs reporting required wilderness medicine content and 75% of programs offering optional wilderness medicine activities. The range of reported optional wilderness medicine activities is extensive. Because many of these opportunities remain optional, however, residents may have to take the initiative to incorporate wilderness medicine in their residency education.

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A Rare Case of Vaginal Bleeding in a Child Due to a Leech Bite and Review of the Literature

To the Editor:

Leeches are ubiquitous creatures of the phylum Annelida and class Hirudinea found in land, freshwater, and marine environments. They usually feed on blood of mammals or small invertebrates. Aquatic leeches have a worldwide distribution, whereas land leeches are common in certain parts of the world.¹ Sri Lanka is a tropical country where both land and aquatic leeches are abundant; however, they are predominantly found in the wet zone, where leech bites on human extremities are commonly encountered.

Vaginal bleeding owing to leech bite is rare, but several incidents in premenarchal girls and postmenopausal women have been reported from different parts of the world, particularly from tropical countries. Travelers should be aware of possible consequences when visiting tropical countries with a high leech population.

We present a case of vaginal bleeding after a leech bite in a 10-year-old premenarchal girl in Anuradhapura, Sri Lanka. The child presented to the Anuradhapura teaching hospital with sudden bleeding from the vagina of 4 hours duration. The child noticed the bleeding soon after a swim in a local irrigation canal (Figure, A; Yoda Ela, location situated on latitude 8.32°N and longitude 80.37°E). A female relative observed part of a “bloated worm” exiting the vagina on examination, and she detached it manually. The live leech was brought in a water bottle with the patient.

On examination, the patient was mildly pale and her vital signs were normal. A gynecological examination did not reveal any signs of external injury suggestive of child abuse or trauma. The site of bleeding was on the anterior edge of the intact hymen. A dressing pad soaked with 0.9% saline was kept on the bleeding site, after which the active bleeding slowed. All vital signs were monitored throughout, and slight bleeding was evident for nearly 10 hours. The patient’s hemoglobin was 10 g/dL and her clotting profile was normal. On the second day she was clinically stable and was discharged.

The live leech was examined under natural light and tentatively identified as *Hirudinaria manillensis* by the external features of the fresh water habitant (Figure, B, C).



Figure. A, Yoda Ela, an ancient manmade irrigation canal. B, Dorsal side of the leech is dark greenish brown with a distinct black dashed line in the middle and 2 dark gray lines on each side. The side of the body is yellow with intermittent black spots. C, Ventral aspect of the leech is dark yellow without any distinct marks.

The leech was released into its natural habitat on the request of the child and her relatives.

Leech bites and their consequences are important in wilderness and travel medicine. Leech bites on various body locations—including body orifices and internal body cavities such as the vagina, uterus, rectum, urethra, urinary bladder, nasal cavity, nasopharynx, oropharynx, esophagus, trachea, bronchus, and even peritoneal cavity—have been reported.¹⁻⁴ Complications of leech bites may range from minor bleeding to profound hypovolemic shock.²

Premenarchal and postmenopausal bleeding as a result of a leech bite bears tremendous gynecological and medicolegal importance as it is an often-missed differential diagnosis in management of vaginal bleeding in patients with unnoticed leech bites.

All leeches have a large posterior sucker to attach themselves to the host and a small anterior sucker containing the mouth with which they make the wound. Land leeches can penetrate the thick skin of the extremities with their powerful muscular jaws, whereas the aquatic leech can only feed on soft tissue because of its weaker jaws.¹ Although aquatic leech bites are less common, these leeches attach to mucous membranes and

enter the orifices of the body to feed and cause severe morbidity in humans by obstructing a viscus or causing severe anemia or persistent hemorrhage leading to shock.

After detachment of the leech, the wound can bleed for hours (the mean time is approximately 10 hours but can be long as 7 days^{4,5}) owing to the wide range of anticoagulants and enzymes in the leech's saliva, such as hirudin, platelet-activating factor antagonist, and collagenase. Leech saliva also contains substances that cause anesthetic effects, preventing detection of its bite.⁶ Unlike land leeches, which detach spontaneously after a blood meal, aquatic leeches remain attached to the host for prolonged periods of time, causing complications.¹

Several cases of vaginal bleeding caused by leech bites in patients in different settings are reviewed in the [Table](#). Almost all the cases were reported from the tropics and subtropics and occurred after a swim or bathing in fresh water. Prolonged vaginal bleeding was the main presenting feature in most of the cases, and the vaginal wall was the most common site of leech bite, followed by the vulva and, in 1 report, the uterus. None of the reviewed cases have authenticated the leech species, probably because of lack of expertise in taxonomy among medical staff.

Table. Review of literature of cases of vaginal bleeding following of leech bite

<i>Author and year</i>	<i>Country</i>	<i>Patient's age</i>	<i>Activity leading to the leech bite</i>	<i>Clinical manifestation</i>	<i>Site of leech bite</i>	<i>Method of leech removal/ management</i>	<i>Leech authentication</i>
Leech bites in children							
Ibrahim et al., 2002 ⁷	Malaysia	9 years (premenarchal)	History of swimming in a river before the incident	Vaginal bleeding, anemia, hymen intact	Slow oozing of blood through the vagina	Normal saline flushed into the vagina	Leech bloated with blood measuring about 2 cm in length; species not authenticated
Aribarg et al., 2003 ⁸	Thailand	10 children between 5 and 10 years (1981–2000)	History of swimming in a river or pond	Vaginal bleeding	Not reported separately	NR	NR
Saha et al., 2005 ⁹	India	5-year-old tribal girl	Had a bath in a pond	Sudden episode of vaginal bleeding	Posterior wall of vagina at the junction of the middle and lower thirds	Removed by plain forceps	Leech found but species not authenticated
Saha et al., 2005 ⁹	India	7 years	Had taken a bath in a small river	Vaginal bleeding	Left lower half of the vagina; about 3 cm above the introitus	Normal saline wash of vagina using a small feeding tube	Black leech; species not authenticated
Hannan et al., 2009 ¹⁰	Bangladesh	12 girls between 4.5 and 11 years (2004–2010)	NRA	Vaginal bleeding in majority	Found inside vagina; bite site not reported	Removal of leech under general anesthesia in 3 cases; normal saline wash in others	NRA
Habtai et al., 2010 ⁶	Eritrea	6 years	Had swum in a nearby river before incident	Vaginal bleeding for 4 days	Leech found inside the vagina; bite site not seen	Leech was removed using plain forceps after flushing 100 mL of normal saline into the vagina	3-cm leech removed; species not authenticated
Saha et al., 2011 ²	India	2 years	Child had been playing in a waterlogged paddy field, relatives saw a leech entering into her genitalia	Vaginal bleeding, abdominal distension, and shock	Peritoneal cavity; probably entered through the uterus	Exploration of the peritoneal cavity by laparotomy and leech removed using a forceps	A tumid leech 10 cm in length; species not authenticated
Leech bites in adolescents							
Prasad et al., 1983 ¹¹	India	16 years; unmarried girl	Had taken a bath in the pond 6 days before incident	Vaginal bleeding for 5 days; profuse vaginal bleeding for 3 days after admission with lower abdominal pain; bleeding from the uterine cavity	Inside the uterine cavity	Dilatation and curettage	Confirmed to be a leech on histological examination; species not authenticated

Table (continued)

<i>Author and year</i>	<i>Country</i>	<i>Patient's age</i>	<i>Activity leading to the leech bite</i>	<i>Clinical manifestation</i>	<i>Site of leech bite</i>	<i>Method of leech removal/ management</i>	<i>Leech authentication</i>
Leech bites in postmenopausal women							
Katsulov et al., 1968 ¹²	Bulgaria	Elderly woman; age NRA	NRA	Hemorrhage	Vaginal wall	NRA	NRA
Hailemariam et al., 1995 ¹³	Ethiopia	50 years	NRA	Vaginal bleeding and anemia	Posterior vaginal fornix	Leech was instilled with about 5 mL (1%) lidocaine, after which it detached itself	Aquatic leech; species not authenticated
Hernández et al., 1998 ⁴	Chihuahua, Mexico	Postmenopausal woman; age NRA	History of swimming in the river	Continuous bleeding for 7 days	Leech bite on the vaginal wall	Removed by means of surgical forceps without complications	NRA
Shahraki et al., 2014 ¹⁴	Iran	75 years	Washing the perineal region with well-water after voiding; authors suspect this may be the source	Painful vulvar lesion; leech tightly attached to the mucosa of the region	Leech tightly attached to vulvar region	Flushed normal saline onto the surface of the lesion	A leech bloated with blood detached gradually; species not authenticated
Mofrad et al., 2012 ⁵	Northeast Iran	79 years	Washed external genitalia with infected water; authors suspect this may be the source	Continuous moderate to severe vaginal bleeding	Stuck to the mucosa of the distal segment of the vagina	Wash with normal saline failed; lidocaine injected directly into the body of the leech to paralyze it	Leech 5 cm in length; species not authenticated

NR, not reported; NRA, not reported in abstract.

Diagnosis of a leech bite is made with the patient's history and clinical examination; however, in a few cases, the leech was accidentally found while investigating the bleeding. In most of the cases, leeches in body cavities were removed either by applying an irritant or by extracting the visible leech with surgical instruments such as plain forceps. A widely used irritant is 0.9% saline, although salt water, vinegar, and tobacco water have also been used to dislodge leeches from their attachment. Manual removal of the leech was attempted in a few cases by applying a local anesthetic agent to the leech to paralyze it.^{5,13} Although access to the vaginal cavity can be easily gained in parous women using a speculum, removal of a leech in a young girl with an intact hymen is challenging. Nevertheless, a catheter can be inserted through the hymenal opening to irrigate the vagina.^{6,8} If these methods fail, examination under anesthesia may be performed to extract the leech (using surgical or endoscopic forceps) by visualizing the vagina with a nasal speculum.⁶

Leeches should not be forcefully removed as this may cause their jaws to remain in situ, facilitating further bleeding and infection. There are 2 reports of leech intrusion into the uterus and the peritoneal cavity that warranted curettage and laparotomy, respectively.^{2,11} Supportive treatment is vital after leech removal, namely packing the bleeding site and administering fluid or blood transfusions and antibiotics as necessary.

Leech bite-related hazards can be prevented by measures such as wearing tight, thick swimwear or underwear, especially when traveling and swimming in leech-infested regions. Using repellants such as diethyl toluamide (DEET), dimethyl/diburyl phthalate (DMP/DPB), or indalone on clothes and skin further facilitates protection against leeches.¹

Although they are rare, leech bites should be considered as a possible cause of vaginal bleeding in children and postmenopausal women. Travelers visiting tropical and subtropical countries where leech infestation is common should take necessary precautions to avoid possible health hazards.

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First Record of an Unusual Incident Between a Finfish—the White Snake Mackerel *Thyrsitops lepidopoides* (Teleostei, Gempylidae)—and a Surfer

To the Editor:

On December 27, 2005, a 27-year-old man fell from his surfboard and hit his face on a solid object during a surfing session in the afternoon (4:00–5:00 PM) at Itararé Beach, in Sao Vicente, a city in the southeast coast of Brazil. He sustained a dislocated jaw and other facial injuries and presented to the nearest emergency department. Because he complained of a severe pain in his face, the emergency department suggested an initial diagnosis of sinusitis and recommended the use of antihistamines. After 3 days with continuous pain, he was taken to the ear, nose, and throat sector of Santa Casa da Misericórdia Hospital, located in Santos, the nearest city, where a computed tomography scan detected fractures in the right maxillary sinus and inferior orbit. He underwent surgery, which began with an incision inside the mouth on the right side, at the height of the gingiva. After locating the first fracture, a foreign body was extracted. An endoscope was introduced in the area, and another foreign body near the orbit was found.

On January 6, 2006, our laboratory received 3 bottles from Santa Casa da Misericórdia Hospital containing these foreign bodies in alcoholic solution. At first view, the bodies appeared similar to pieces of the jaw of a fish. A careful examination of the tooth pattern identified the pieces as the bottom jaw of a white snake mackerel, *Thyrsitops lepidopoides* (Cuvier, 1832) (Figure 1). This determination was based on the 8 to 10 small, uniserial, caniniform teeth interrupted by smaller molariform teeth (Figure 2) in each side of the jaw that were not turned back (as distinct from the barracuda genus *Sphyraena*).

The patient did not require hospitalization after removal of the fish jaw fragments. Abscesses were not reported in his wounds, and only minor edema was observed at the back of the right eye.

The white snake mackerel *Thyrsitops lepidopoides* is a species of teleost fish from the southwest Atlantic



Figure 1. Fresh specimens of *Thyrsitops lepidopoides* (Cuvier, 1832) caught in the area near the accident (photography by the author).

common on both sides of South America that holds little interest for fishermen. During the austral summer months (December to February), this fish species often swims near the coast for feeding purposes (mainly on sardines and anchovies).¹ Comparing the teeth found in the victim and the teeth of fresh white snake mackerel, we estimate that the fish was between 200 and 250 mm in total length.

The accident occurred on a popular urban shallow-water beach (23°58'S and 46°21'W), located in the east of Santos Bay on the central coast of São Paulo State in southeastern Brazil. Previous reports show fish appearances in this area, which is a popular surfing location. The waves in this bay are mainly promoted by easterly winds that facilitate the invasion of colder waters on the coast. The discharge of urban sewage effluent into the sea through small channels results in an increase to the local eutrophication, promoting high availability of food for planktivorous species, such as sardine. As a consequence, predators such as the white snake mackerel flourish.

This is the first reported accident involving *T. lepidopoides* and humans. Except for sharks and rays, accidents involving surfers and other fish species are scientifically underreported. Most of the data refer to injuries caused by needlefish from the Belonidae family.^{2–4} Abnormal cases, such as bites attributed to the bluefish *Pomatomus saltatrix*, were reported in Florida.⁴ A review of emergency departments in Australia⁵ on cases of marine animal attacks did not indicate similar cases concerning other finfishes.