



Potential value of slug secretions in the treatment of wounds.

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Abstract

It has been found that the Terrestrial molluscs (slugs and snails) has important property of secreting slime which is used for the treatment of minor wounds and other skin disorders such as warts. This article provides information regarding the properties of slug slime and considers its potential value in modern wound therapy.

Introduction

The snails and slugs have similar morphology but the snails possess the shell but the slugs don't have the definite shell but some of them have the vestigial shell. It is widely distributed around the world; the largest species of slug can exceed 25 cm in length.

Both slugs and snails secrete visco-elastic slime or mucus which is helpful in both for adhesion and lubrication and enables the animal to adhere and glide over any type of surfaces. Mucus also prevents the creatures from drying out. The mucus secreted is also helpful in preventing the animal from infection and facilitate the quick healing.

Snails are taken as food and also have a great medicinal value rather than slugs. *Arion hortensis*, the common garden slug is sometimes swallowed whole as a treatment for gastritis or stomach ulcers (Quave et al) and also used for skin problems like skin lesions with no skin scars. Crushed snails were used for skin inflammations. In America slugs are taken as 'Slug Syrup' which is used for the treatment of ulcers, bronchitis, asthma.

Some of the products like 'Elicina' a Chilean snail slime-based product and 'Missha' then launched Super 'Aqua Cell Renew Snail Cream', which claims that its 70% snail extract 'soothes regenerates and heals skin'. Snail slime based products are also used to treat acne, reduce pigmentation and scarring, and combat wrinkles. Mucus collected from a slug is rubbed onto the skin to treat dermatitis, inflammations, calluses, and acne, and to promote wound healing. In addition they are also used for the treatment of warts. Mucus from a live slug is first rubbed onto the wart, and then the slug is hung out in the sunshine to dry out and die.

Snail products may even have a role in orthopaedics which consists of crystals of calcite which might participate in the mechanisms of bone healing.

The principal benefits associated with the use of slugs and snails as topical

treatments are therefore associated with the chemical and/or physical properties of the slime or mucus.

Slug mucus: Production and properties

The mucus producing cells are located in the epithelium of the skin, both on the foot and upper surface of the body. Slugs produce two types of mucus; pedal mucus which is thin and contains about 96-97% water, and the other form which is produced over the entire body. This is more thick and sticky. Both types are hygroscopic.

The precursor of slime is initially produced in the form of highly hygroscopic grains which are then stored within the cells in the form of granules coated with a protective water resistant membrane which keeps them dry. This covering breaks open only after they have been released from the cell, a process which is thought to be mediated by contact with extracellular ATP. At this point the granules very rapidly absorb up to 100 times their initial volume of water to form the familiar mucus or slime trail.

The slime acts like solid glue when the animal is at rest, but liquifies when an adequate stress or force is applied to it. When the applied stress is removed, the slime quickly re-solidifies.

Composition of slime

Different species of snails and slugs have different composition of slime. Mucus consists of a complex mix of proteoglycans, glycosaminoglycans, glycoprotein enzymes, hyaluronic acid, copper peptides, antimicrobial peptides, and metal ions. Atomic absorption spectrometry showed that glue from the slug *Arion subfuscus* contains of zinc, iron, copper and manganese which shows that some metal ions play an important role in gel formation.

According to various studies it has been found that mucus contains peptides such as mucin which possess antibacterial activity against both Gram positive and Gram negative bacteria. These antimicrobial peptides not only act as natural antibiotics, but also stimulate many elements of the immune

system, including barrier repair and inflammatory cell recruitment. The antibacterial factor from the body surface of the Giant East African Snail, *Achatina fulica*, for example, exhibited highly positive antibacterial activity both for the Gram-positive bacteria, *Bacillus subtilis* and *Staphylococcus aureus* and for the Gram-negative bacteria, *Escherichia coli* and *Pseudomonas aeruginosa*, but this activity was lost when the material was heated at 75° C for 5 min. The antibacterial factor of the snail mucus was shown to be a glycoprotein with a molecular weight of about 160,000.

Slug slime also contain a local anesthetic so is used to treat toothache. These local anaesthetic properties in combination

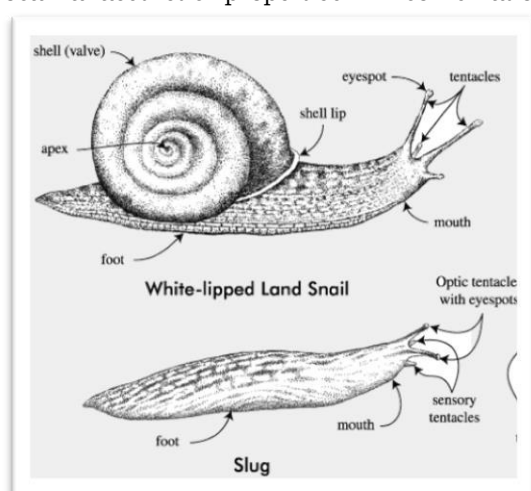


Fig. Snails and Slugs

Results

According to the survey it was found that the moist conditions produced by the mucus initially caused the wart to become hydrated which helps to increase the size of the finger-like projections growing from the surface. After the completion of the treatment these projections were lost and eventually the location of the wart became virtually indistinguishable from the rest of the skin.

Discussion

The use of slugs and snail is highly risky and sometimes act as vectors of disease. *E.coli* and other bacteria present in their faeces remain there for long external and internal survival period. Slugs and snails can also become a vector of rat lungworm a disease caused by a parasitic worm *Angiostrongylus cantonensis*. Lungworms are dangerous because once ingested they first head to the brain where they can cause meningitis type symptoms, with damage to brain tissue and

with the antimicrobial properties and hygroscopic nature of the slime might be useful in treating superficial burns in humans.

slime from *Cryptomphalus aspersa* commonly known as common garden snail contains antioxidant superoxide dismutase (SOD) and Glutathione-S-Transferase Activity (GST) activities. SODs act as antioxidants and protect cellular components from being oxidized by reactive oxygen species. Earlier studies have also reported that the snail slime stimulated fibroblast proliferation, extracellular matrix assembly and the regulation of metalloproteinase activities and concluded that the secretion's induced cellular regeneration, and hence its possible use in repair of wounded tissues.

swelling of the brain before the lungworm dies. Many people show no symptoms at all before the lungworm dies but others are greatly affected.

Conclusions

The results of the brief literature survey review identify the potential value of slug secretions in the treatment of wounds.

As the plant kingdom has long been recognized for its medical products, as compared to the animal kingdom in this regard.

Perhaps in the future the slugs will be widely used for the new treatment for wounds which incorporates agents that accelerate healing whilst providing a degree of antiseptis and local analgesia.

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