

Cannibalism of the medical leeches *Hirudo verbana*

Ruslan Aminov ¹

¹ Department of Biology, Zaporizhzhia National University, Zaporizhzhia, UKRAINE

*Corresponding author: 91_amin_91@ukr.net

Abstract

The experiment involved 150 hungry ML (*Hirudo verbana* Carena, 1820) aged 7-8 months, whose last feeding with blood of cattle was 4 months ago and 150 leeches in the first days after blood feeding (human and cattle). Before the experiment and after, not fed and after feeding leeches weighed in the scales. After landing in one container of not fed and fed leeches, after 20 minutes of *Hirudo verbana*, who were hungry attacked on the fed. Cannibalism manifested itself in one-fourth of all the hungry leeches. As a result of the study, we found that non-feeding manifested cannibalism to blood-fed medical leeches *Hirudo verbana* in the early days.

Keywords: cannibalism, behavior of medical leeches, hematophagus, blood

Aminov R (2019) Cannibalism of the medical leeches *Hirudo verbana*. Eurasia J Biosci 13: 23-26.

© 2019 Aminov

This is an open-access article distributed under the terms of the Creative Commons Attribution License.

INTRODUCTION

Medical leeches (ML) - belong to the type of annel worms Annelidia, class - Hirudinea, subclass - the real leeches Archihirudinea, detachment - Archinobdella, family Hurudinidea. These are widespread animals of freshwater reservoirs of all continents. More than 600 species of leeches are known. Medical leeches - hematophagi, can suck the blood of all classes of vertebrates (Alice 2017, Aminov 2017, 2018, Canpolat 2004, Popov 2008, 2014, Rychapova 2017, Sobczak 2014), preferring amphibians (Gerry 2011, Larila 2002, Merilä and Sterner 2002, Reshetnikov 2001, Shikov 2011), large and small cattle (Frolov 2010, Kasanchuk 2009, Kondratieva 2015), human (Abduvaliev 2017, Baskova et al. 2015, Kontyrtaeva 2016, Valerio 2017, Zharov 2003). For medical leeches there is a competition for food resources. Hungry individuals MP become more active and begin to respond to stimuli associated with food. They with incredible greed pounce on the first thing they got in the water, in the hope of at least something to profit, even by rottenness, deadness (they suck in and to the corpses, but they soon disappear) or sucked to full leeches (especially if fed and hungry in one dish) (Kamenev 2004). And this despite the fact that the blood sucked in the leech in her body changes and takes a special nasty smell, repelling even the hungry leeches. Blood, squeezed out of the pumped leeches at once, again and harmlessly can be absorbed by others. Moreover, absolutely hungry leeches are compelled to attack their own kind, and the weak are made victims of the strong, and the saturated ones are hungry. Cannibalism is inherent in leeches, especially horse. Being hungry or not enough pumped, they attack larger animals that are well drunk with blood, sucking it from them, until the death of the latter (Egorova 2016).

Therefore, it became important to investigate the manifestation of cannibalism in the medical leech of *Hirudo verbana*.

MATERIAL AND METHODS

The experiment was taken on 150 non-fed ML pharmacy (*Hirudo verbana* Carena, 1820) aged 7-8 months, grown on the basis of the educational and research laboratory of cell and organism biotechnology of Zaporozhye National University «Medical leech», sanitary and epidemiological conclusion of the Ministry of Health of Ukraine. The last feeding with blood of large horned cattle was 4 months ago and 150 leeches in the first days after feeding with blood (human and cattle). ML was kept in the amount of 5 un-fed and 5 fed, in 3-liter bottles of dechlorinated wastewater with a volume of 2 liters at an ambient temperature of + 22-24°C. Before the experiment and after, not fed and after feeding leeches weighed in the scales. In the experiment, on average, all the same mass of leeches were taken, not fed 1.50 ± 0.05 g and the same leech mass after feeding 5.50 ± 0.10 g. In total, 300 leeches were used in the experiment.

Statistical processing of the obtained results was carried out using parametric statistical methods using the Microsoft XP "Excel" software package and IBM SPSS Statistics 21.0 (USA). In the case of compliance with the normal distribution law, the characteristics in the investigated samples were investigated by the parametric method (St-Student's t-criterion), the values in the tables being represented as $X \pm SE$, where X is the

Received: October 2018

Accepted: December 2018

Printed: February 2019

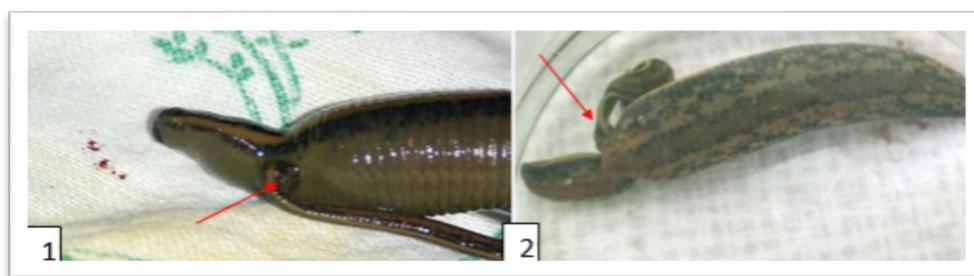


Fig. 1. Attached hungry leeches to fed leeches: 1, 2

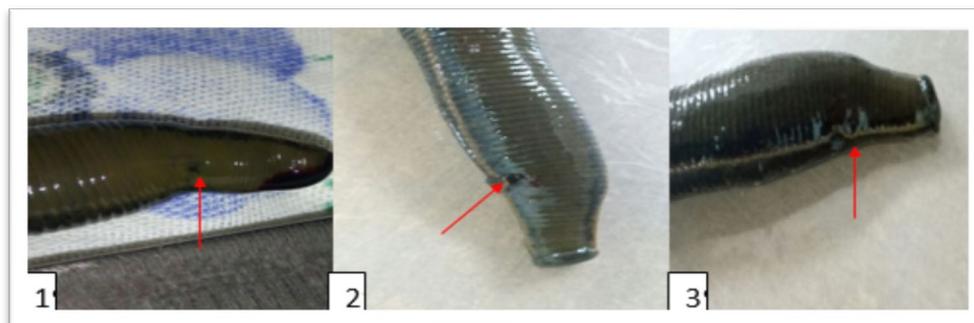


Fig. 2. The wounds of the leeched leeches *Hirudo verbana*, after dropping hungry: 1, 2, 3

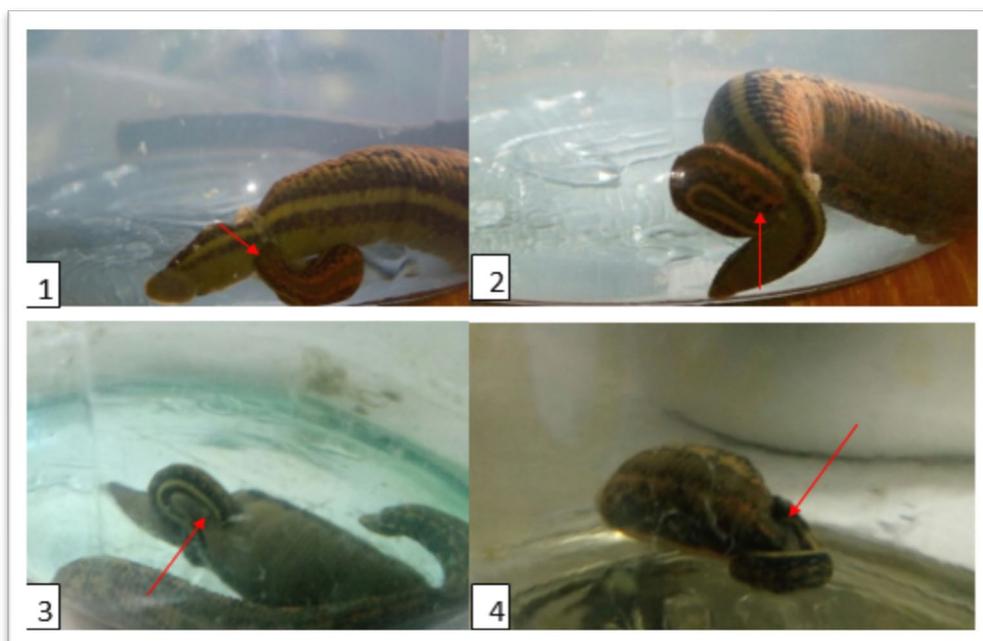


Fig. 3. Repeated attack and attachment of the hungry to the injuries on feeding leeches *Hirudo verbana*: 1, 2, 3, 4

sample mean, SE is the standard error of the mean. Differences were considered reliable at a significance level of $p < 0.05$.

RESULTS AND DISCUSSION

After landing in one tank, not fed to nursing medical leeches *Hirudo verbana*, after 20 minutes of leeches, who were on hunger attacked the fed, trying to creak to them with both suckers: front and back (**Fig. 1**).

After the dropping of hungry leeches *Hirudo verbana* from the fed in 20-40 minutes, on their body there were significant deepened wounds, with a width of up to 6 mm (**Fig. 2**).

After a while, hungry leeches again attacked the fed, and tried to attach themselves to the same places where before they had made deep wounds (**Fig. 3**).

The filaments of the leeches, taken from the cocoons on the first day, which succumbed to blood feeding, were

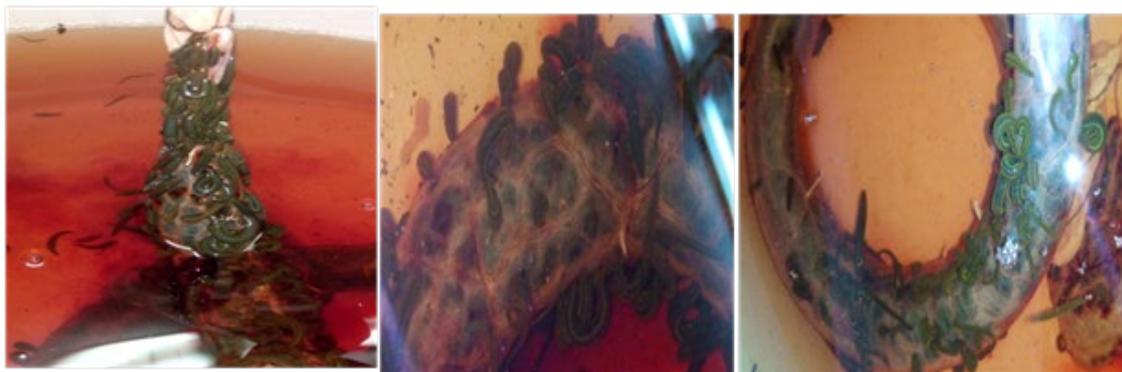


Fig. 4. Feeding leeches on the first day after leaving cocoons: 1, 2, 3

Table 1. Mass of medical leech *Hirudo verbana* before and after cannibalism, $X \pm SE$

Group of animals	Weight of animal g, n=150		Body wounds mm
	Non-fed	Fed	
Before the landing	1,50±0,05	5,50±0,10	6,00±0,01
After the landing: the first attack	1,60±0,02*	5,40±0,08	5,91±0,02
After the landing: the second attack	1,75±0,04*	5,25±0,03*	6,03±0,03
After the landing: the third attack	1,81±0,07*	5,19±0,07*	5,98±0,01

Note: * - $p < 0,05$ in comparison with the control group

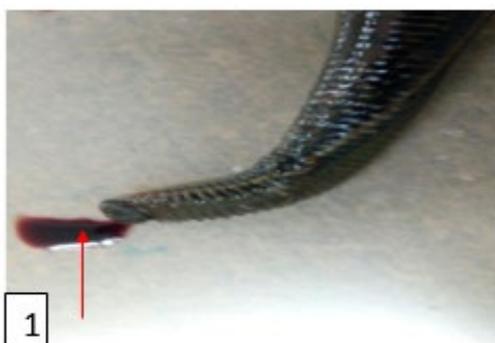


Fig. 5. Released blood of the leech *Hirudo verbana* from the oral apparatus

also examined by us. Almost all the leeches immediately attacked the intestine of the horned cattle, which was filled with blood, which indicates that the leeches already on the first day after exit from the cocoons hungry (**Fig. 4**).

The well-known fact that hungry leeches become more active and begin to react to any stimuli associated with food and trying to rush to the first thing in the water, in the hope of at least something to profit, this can be explained in the results of cannibalism in hungry leeches *Hirudo verbana*.

Cannibalism manifested itself in one-fourth of all the hungry leeches. Breastfeeding leeches after the first attacks of the hungry, tried to stay on top and not fall to the bottom of the cans, and also when approaching the hungry leeches did wavy movements, so that the leech could not again attack. We also conducted mass measurements of non-fed and fed leeches before and after cannibalism (**Table 1**).

As a result, we found an increase in the weight of the hungry and a decrease in feeding leeches, which indicates the manifestation of cannibalism.

Fed leeches after two or three attacks, tried to release a little blood from the mouthpiece, this behavior may indicate the diversion of not fed leeches to reduce their attacks (Egorova 2016) (**Fig. 5**).

It should be noted that manifestations of cannibalism we were registered only on the first days after feeding leeches *Hirudo verbana*. In nature, feeding leeches can hide from the hungry, so it is difficult to determine whether they have manifestations of cannibalism or not. In our studies, similar conditions were created both in nature, but the leeches fed could not escape from the hungry, so in more detail it was possible to investigate the manifestations of cannibalism in them. Also received massive changes of both hungry and fed leeches only confirm the cannibalism of *Hirudo verbana*.

CONCLUSIONS

As a result of the study, we found that in non-fed medical leeches *Hirudo verbana*, manifested cannibalism to blood-sucking leeches in the early days. Hungry *Hirudo verbana* try not just to gnaw deep wounds up to 6 mm wide in leached leeches and get to the blood they have absorbed.

Fed leeches try their best to distract and protect themselves from the hungry: wave-like movements, the release of a small amount of blood from the oral apparatus, attaching themselves to the suction cups by the walls on the tops and trying not to fall to the bottom of the cans.

REFERENCES

- Abduvaliev AA, Daurekhanov AM (2017) Hirudotherapy in complex treatment of patients with reactive arthritis. Vestnik of KazNMU: 250-252.

- Alice G (2017) Recent contributions to development of herbal-based immunomodulators for farm animals. *Cell Immunol Serum Biol.* 3(1): 68- 77.
- Aminov RF, Frolov AK (2017) Influence of ectoparasite - *Hirudo verbana* on morphogenetic reactions of the host organism – rattus. *Current trends in immunology.* 18: 107-117.
- Aminov RF, Frolov AK (2018) The impact of fetal load of *Hirudo verbana* saline extract antigens morphometrical, hematological and immunological parameters of rats in the early stages of post-embryonic development. *Annals of parasitology.* 64(1): 13-20.
- Bashkirtseva NA (2008) Treated with leeches. SPb., Krylov.
- Baskova IP (2015) Hirudotherapy scientific basements. Humoral link, Tula, Akvarius.
- Baskova IP, Isakhanyan GS (2004) Hirudotherapy. M., Monolith.
- Canpolat İ, Sağlam N (2004) Treatment of aural hematomas in dog with the medicinal leech, *Hirudo medicinalis*. *Doğu Anadolu Bölgesi Araştırmaları.* 2 (2): 67–69.
- Egorova SN, Garifullina GK (2016) Pharmaceutical counseling: medicinal leech (*Hirudo medicinalis*). *Medical bulletin of Bashkortostan.* 5: 19-24.
- Frolov A, et al. (2010) Influence of hirudotherapy on physiological parameters in the goats / *Animal husbandry of Ukraine.* 7: 7-10.
- Frolov AK, Tokarenko AI (2011) Immunity changes in patients with essential hypertension under the influence of biologically active substances of medicinal leech. *Zaporozhye Medical Journal.* 2 (13): 23-26.
- Gerry SP, Ellerby DJ (2011) Serotonin modulates muscle function in the medicinal leech *Hirudo verbana*. *Biology Letters.* 4: 25-28. <https://doi.org/10.1098/rsbl.2011.0303>
- Kamenev OYu, Baranovsky AYU (2006) Treatment with leeches: theory and practice of hirudotherapy: a guide for doctors. SPb,Ves.
- Kasyanchuk V, Ivannikova O, Marchenko A (2009) Definition of subclinical mastitis in the cows using morphofunctional indices of udder and mathematical modeling. *Animal husbandry of Ukraine.* 9: 24-28.
- Kondrateva MM, Sidorova KA, Glazunova LA (2015) Influence of hirudin on hematologic indices in the cows with subclinical mastitis. *Agricultural sciences.* 3(30): 58-63.
- Konyrtaeva NN, et al. (2016) Hirudotherapy in Kazakhstan: a contingent of patients and adherence to treatment. *Human Ecology.* 2: 42-48.
- Laurila A, Pakkasama S, Crochet PA, Merilä J (2002) Predator-induced plasticity in early life history and morphology in two anuran amphibians. *Oecologia.* 132: 524-530. <https://doi.org/10.1007/s00442-002-0984-7>
- Merilä J, Sterner M (2002) Medicinal leeches (*Hirudo medicinalis*) attacking and killing adult amphibians. *Annales Zoologici Fennici.* 39: 343-349.
- Popov LK, Dolgova SA, Popova IS (2008) Hirudopuncture with endometritis in the dogs. *Veterinary Medicine.* 10: 55-56.
- Popov NS, et al. (2014) Morphological changes in the skin of rats with external application of the leech extract of a medical with thermal burn. *Verkhne-Volzhsy medical journal.* 12(2): 45-50.
- Pospelova ML, Barnaulov OD (2010) Effects of hirudotherapy on intravascular thrombosis activation in different groups of patients with cerebrovascular pathologies. *Aktuelnosti neurol, psihijatrije granicnih podrucja.* 18(1): 27-32.
- Reshetnikov AN (2001) The introduced fish, rotan (*Perccottus glenii*), depresses populations of aquatic animals (macroinvertebrates, amphibians, and a fish). *Hydrobiologia.* 510: 83-90. <https://doi.org/10.1023/B:HYDR.0000008634.92659.b4>
- Rychapova LS (2017) Experience in the use of hirudotherapy with endometritis in cats and dog-spirant. *The successes of modern science and education.* 6(3): 182-185.
- Savinov VA (2004) Hirudotherapy. Moscow, Medicine.
- Shikov EV (2011) *Haemopsis sanguisuga* (Linnaeus, 1758) (Hirudinea) – the first observation of a leech predation on terrestrial gastropods. *Folia Malacologica.* 19(2): 103-106. <https://doi.org/10.2478/v10125-011-0016-5>
- Sobczak N, Kantyka M (2014) Hirudotherapy in veterinary medicine. *Annals of Parasitology.* 60(2): 89-92.
- Valerio E, et al. (2017) Use of *Hirudo medicinalis* in paediatric reconstructive surgery. *Arch Dis Child Educ Pract Ed:* 1–2.
- Zharov DG (2003) Secrets of hirudotherapy or how to be treated by leeches. Rostov on Don., Phoenix.