

Doktordisputas

Dissertation



Helge Kreützer Johnsen forsvarte sin avhandling «Nasal Heat Exchange. An experimental study of effector mechanisms associated with respiratory heat loss in Norwegian reindeer (*Rangifer tarandus tarandus*)» ved Universitetet i Tromsø den 7. juli 1988. Helge K. Johnsen er vokst opp på Finnsnes i Troms, Norge. Han har sin utdannelse fra Universitetet i Tromsø. Hovedfageksamen i fysiologi 1983: «Nasal vann- og varmeveksling hos norsk rein (*Rangifer tarandus tarandus*).»

For tiden universitetsstipendiat ved Universitetet i Tromsø, Avdeling for Arktisk Biologi.

Helge Kreützer Johnsen defended his PhD thesis «Nasal Heat Exchange. An experimental study of effector mechanisms associated with respiratory heat loss in Norwegian reindeer (*Rangifer tarandus tarandus*)» at the University of Tromsø on 7 July 1988. He was educated at the University of Tromsø and is now working at the same university with a university scholarship.

Summary: Nasal heat exchange is an important effector mechanism both for reduction of heat loss in the cold and for facilitation of respiratory heat loss under hyperthermic conditions. Control of nasal heat exchange is determined by autonomic activity on the basis of peripheral and central thermal inputs to the temperature controller. Operation of the mechanism is achieved through three complementary, but functionally separate effector mechanisms depending on the level of the thermal load. These include a circulatory, a secretory and a respiratory component.

Based on physiological and anatomical evidence from studies on reindeer it is suggested that reduction of respiratory heat loss in the cold is mainly the result of counter current circulation in the nose which results in a temperature gradient along the turbinates. In this situation the blood runs rostrally within the arterial network and returns caudally within the venous plexus before it leaves the nasal mucosa via the sphenopalatine group of veins.

During panting, on the other hand, vasodilation of the nasal mucosa, accompanied by enhanced secretory and respiratory activity, is followed by increased shunt flow through AVAs with subsequent direction of venous blood through the anterior outlet, the dorsal nasal veins. In this situation, therefore, blood flow to the nose is distributed unidirectionally within the nasal mucosa, but counter current with respect to the inspired air thereby permitting optimal heat loss from the nasal mucosa. At moderate levels of heat stress the cold venous effluent from the nose is conveyed to the jugular veins directly and used for general body cooling. When body temperature exceeds a certain threshold the blood is re-routed and directed to the cavernous sinus for selective cooling of the brain. Distribution of the cold venous effluent in either direction is suggested to be due to sympathetic control of vasomotor tone in the angular oculi and facial veins on the basis of an antagonistic adrenergic neuroeffector organization of the vessels.

Transition from closed to open mouth panting at high levels of heat stress, which is accompanied by continued inspiration through the nose and expiration through the mouth, has two important consequences. Firstly, heat loss from the nasal mucosa is improved because the obligatory partial heat recovery, which takes place when the expired air passes over the slightly cooled surface of the nasal turbinates, is avoided. Secondly, selective cooling of the brain is maintained.

Master of science

Rolf Egil Haugerud, Universitetet i Tromsø, har vært oppe til hovedfageksamen (Cand. Scient.) i økologi, zoologi 17. juni 1988 med oppgaven «A life history approach to the parasite-host interaction *Linguatula arctica* Riley, Haugerud and Nilssen, 1987 - *Rangifer tarandus* (Linnaeus, 1758)» som består av to engelskspråklige artikler. Rolf Egil Haugerud er født 1944 i Drammen, har lærerskolen fra Tromsø 1965-67, studerte nordisk og biologi ved Universitetet i Trondheim 1970-73. Utenom studiene har han vært knyttet til skoleverket i Nord-Norge 1964-84. Han deltar nå i prosjektet «Makroparasitter hos rein».

Bihulemarken *Linguatula arctica* er en tungemark (Pentostomida) som finnes hos rein, først og fremst hos kalver. De fleste kalvene er infisert med etterlarvale stadier i bihulene utover høsten og vinteren. Bortsett fra sluttlarvestadiet som er funnet i de øvre luftveier, er de tidligere larvestadier ikke observert, men sannsynligvis er de å finne i forskjellige innvoller før sluttlarvene ankommer bihulene fra august til november. Det er registrert vertsreaksjoner, men uten kjennskap til larvene, er det for tidlig å si noe bestemt om patogen betydning.