



MARCH 12, 2026

THE UNIVERSITY
of
MONTANA WESTERN

BOARD OF REGENTS
MEETING





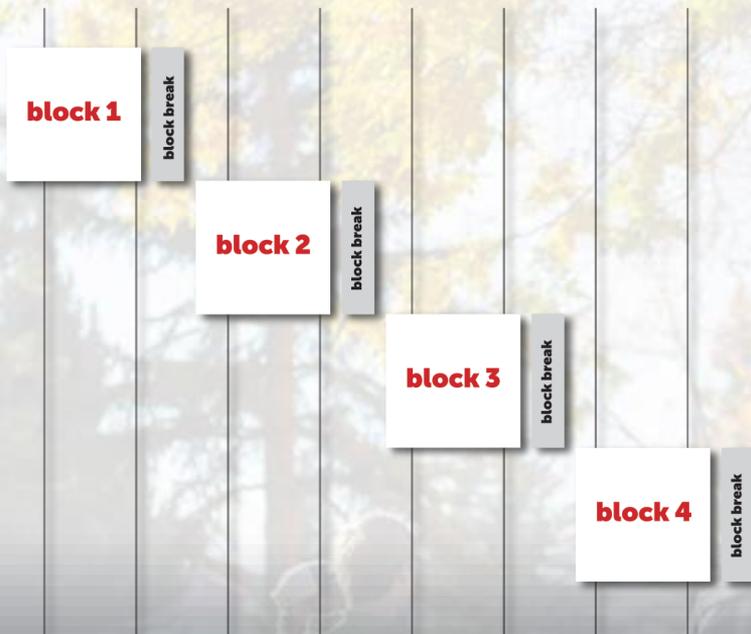
UMW is a regional, comprehensive university that serves a distinct and specific purpose.





Beaverhead County
Community connections: businesses, partners, and volunteers





Only Public University with a
BLOCK SCHEDULE

4 COURSES
PER SEMESTER

16 CREDITS
PER SEMESTER

18-DAY
COURSES

Block Schedule

What does it make possible?





Construction & Renovation
Block Hall and Campus Storage Facility

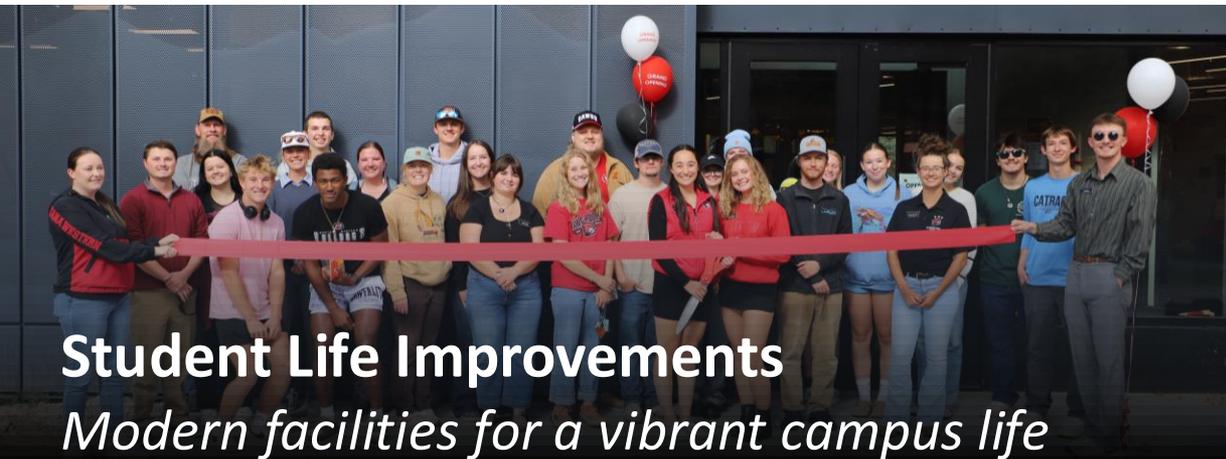






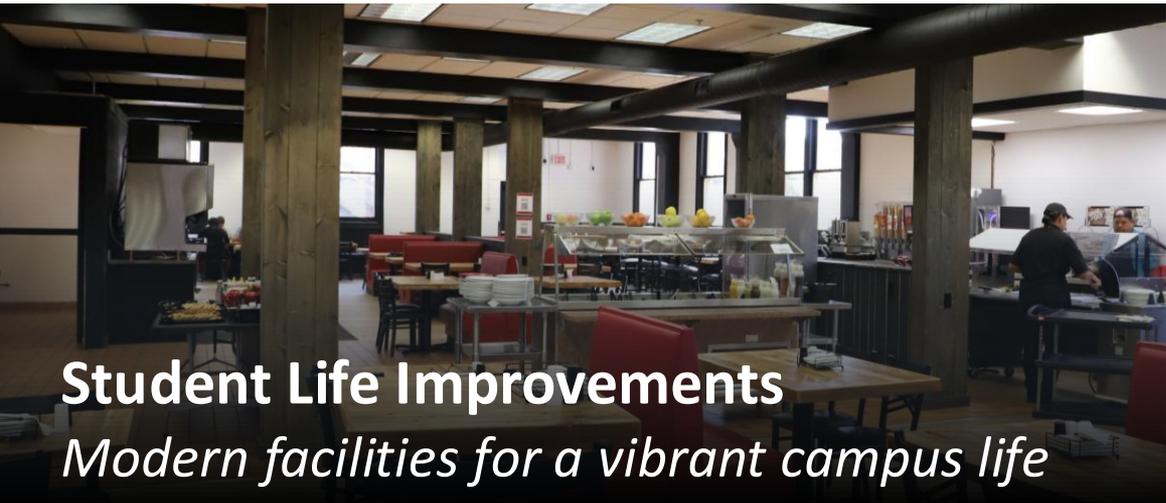
Student Life Improvements
Modern facilities for a vibrant campus life





Student Life Improvements
Modern facilities for a vibrant campus life

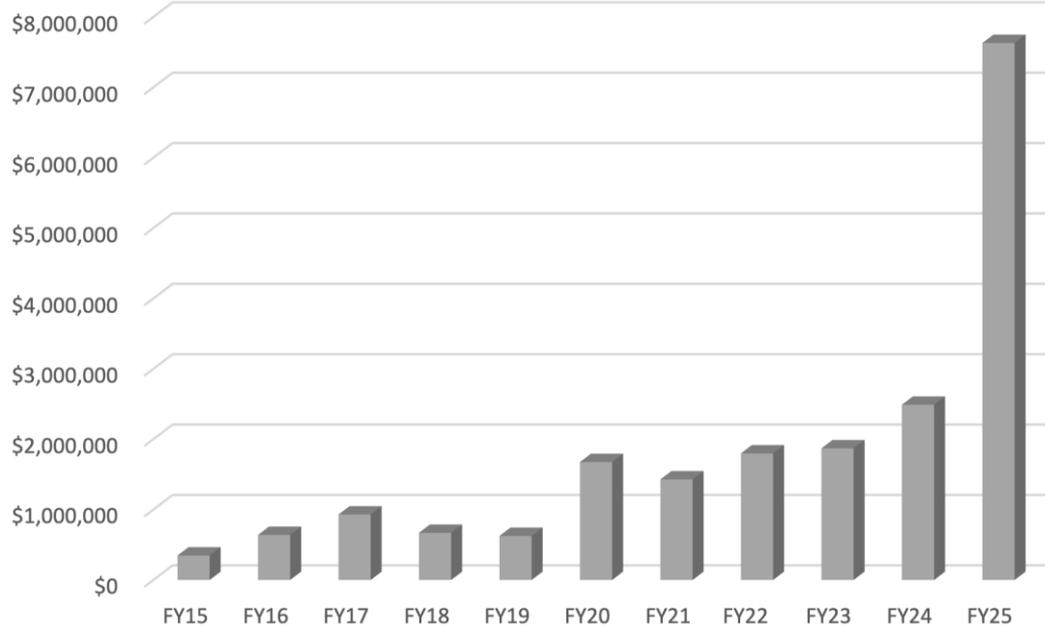




Student Life Improvements
Modern facilities for a vibrant campus life



UMW Foundation Annual Fundraised Amounts



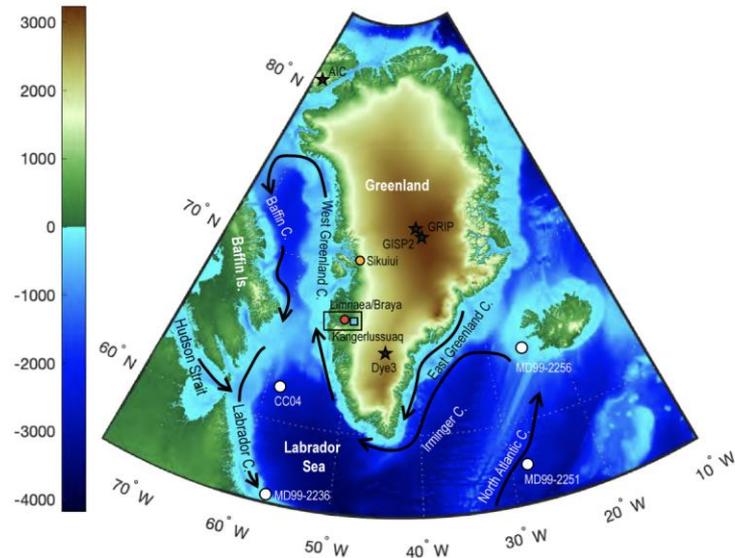
Fundraising
Experience One Campaign





UMW Professor Helps Shed Light on Rapid Climate Change in Greenland 8,200 Years Ago

Dr. Spruce Schoenemann





**UMW and IBILTA Announce Virtual International Conference
on Innovative Learning and Teaching**
September 29-30, 2026





BrainFest and Future NOW Expo
Opportunities for Montana High School Students

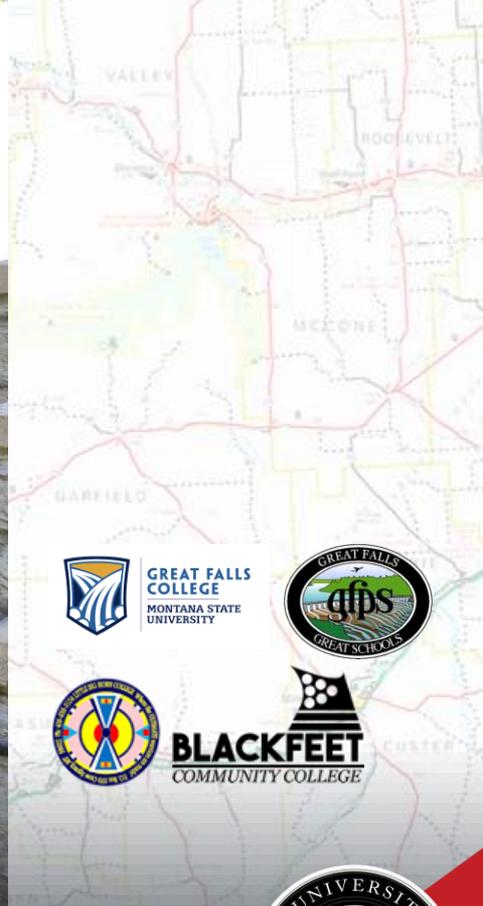




TEDx

University of Montana
Western





Innovations & Partners in Delivering Education
Providing degree completion options in MT communities



GREAT FALLS COLLEGE
 MONTANA STATE UNIVERSITY

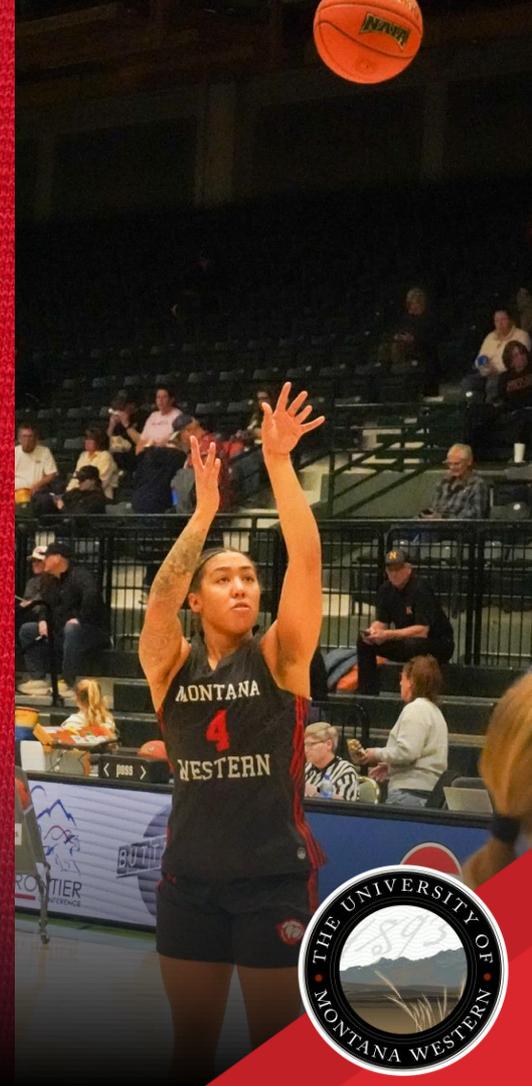


BLACKFEET
 COMMUNITY COLLEGE





Keke Davis





George M. Dennison Civic Engagement Scholarship Recipients
Vivian Mayers and Lanie Crabb





UMW's Business Idea Pitch Competition Opens Doors for Student Opportunity





UMW Biology Graduate Nicolas Johnston Accepted into Genetics Ph.D. Program

Proposed mechanism for head shaking behavior in Spiny Dogfish Sharks (*Squalus acanthias*)

Nicolas R. Johnston, Bradley M. Wood
Biology Department, University of Montana Western, Dillon, MT

The Society for Integrative & Comparative Biology

Head shaking behavior in Spiny Dogfish Sharks (*Squalus acanthias*) are an effective means of food processing. Although much is known about the mechanics and physiology of biting behaviors during head shaking, the potential muscles involved in moving the head side-to-side are less well known. We have identified a previously unspecified, yet well defined, hypaxial muscle that has the ideal orientation, position, and attachments to generate the necessary forces for lateral head shaking motions. This muscle arises caudally from the supracoracoid cartilage and inserts cranially onto the caudolateral processes of the chondrocranium, while also attaching to the cranial-most caudal vertebrae. Its pennate muscle fibers share a common tendon of insertion onto the caudolateral angle of the chondrocranium. These tendon fibers then continue along a cartilaginous bar to terminate onto the outer angle of the chondrocranium. Since this muscle lies in the horizontal plane, deep to the horizontal skeletal structures separate and superficial to the branchial region, its contraction would generate the moment necessary to turn the head ipsilaterally. Furthermore, the pennate morphology of this muscle enables the ideal orientation of muscle fibers as the head sweeps laterally. By traveling along a cartilaginous bar, the muscle of insertion avoids compressing the emerging glossopharyngeal (IX) nerve. We propose to name this muscle the *Musculus paraspinalis*.

Fig. 1. A photograph of a Spiny Dogfish Shark (*Squalus acanthias*) turning right and illustrating the ability of some sharks to laterally bend the head relative to the pectoral girdle. Credit to NOAA Photo Library



Fig. 2. Dissection of the head region showing the supracoracoid cartilage, clasper cartilage, and clasper muscle. Labels: Supracoracoid cartilage, Clasper cartilage, Clasper m.



Fig. 3. Dissection of the head region showing the supracoracoid cartilage, clasper cartilage, and clasper muscle. Labels: Supracoracoid cartilage, Clasper cartilage, Clasper m.



Fig. 4. Careful removal of the epibranchial musculature reveals tendons traveling from the myosapta of the "paraspinalis" muscle toward the cranial-most vertebrae (black arrows). Medially, the muscle fibers of the "paraspinalis" blend with those of the epibranchial musculature, suggesting that the latter assists in lateral movements of the chondrocranium. However, the "paraspinalis" muscle is in the most ideal position to generate the ipsilateral force necessary for movement of the chondrocranium. Near the point of insertion onto the caudolateral angle of the chondrocranium, the branchial branch of the vagus (X) nerve, the visceral branch of the vagus (X) nerve, and the posterior lateral line nerve travel along the dorsal surface of the "paraspinalis" muscle. Cranial is to the right.

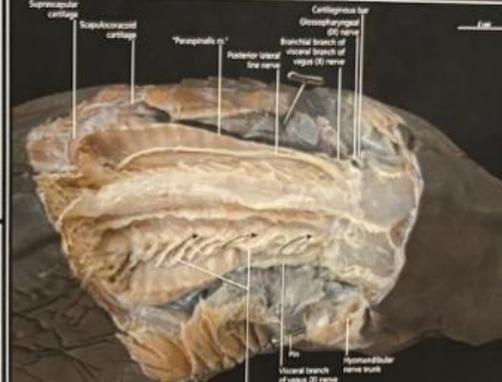


Fig. 5. A free-body force diagram showing the horizontal forces and moments (M_x) about the shoulder girdle (C) that would be generated by the "paraspinalis" muscle based upon its attachments to the chondrocranium (F) and to the cranial-most vertebrae (F_v). (A) In the upright position, prior to a turn, contraction of the right "paraspinalis" muscle causes the clockwise moment necessary to turn the head to the right. (B) In the bent position after a turn, contraction of the left "paraspinalis" muscle causes the counterclockwise moment necessary to turn the head to the left. (C) This model also explains why the muscle fibers of the "paraspinalis" muscle gradually become medially oriented as they approach the cranial-most vertebrae. Labels: C = caudal cartilage; CP = gill muscle; SC = supracoracoid cartilage; F = force; F_v = force; M_x = moment; TP = tendon of "paraspinalis" m.; VBV = visceral branch of vagus (X) nerve.

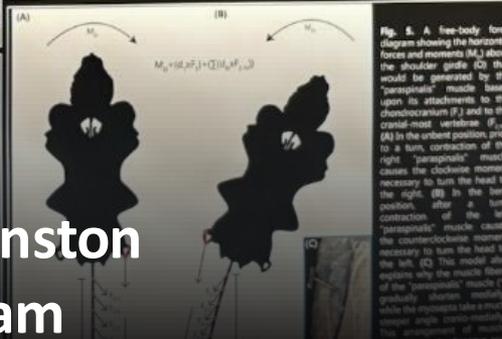


Fig. 6. (A) The "paraspinalis" muscle inserts onto the caudolateral angle of the chondrocranium and travels across a cartilaginous bar to insert on the outer angle of the chondrocranium. (B) Magnified area corresponding to the green box in (A) to observe the cartilaginous bar that the tendon of the "paraspinalis" travels along to terminate on the outer angle of the chondrocranium. By traveling along this bar, the tendon avoids compressing the emerging glossopharyngeal (IX) nerve when the "paraspinalis" muscle contracts. (C) Magnified area corresponding to the red box in (A) to observe the nerves emerging in close proximity to the "paraspinalis". Caudal to the magnified area in (C), the visceral branch of the vagus (X) nerve diverges from the posterior lateral line nerve and travels along the ventral surface of the "paraspinalis". Labels: BV = branchial branch of visceral branch of vagus (X) nerve; CN = cartilaginous bar; GN = glossopharyngeal (IX) nerve; PLL = posterior lateral line nerve; TP = tendon of "paraspinalis" m.; VBV = visceral branch of vagus (X) nerve.



Fig. 7. Transverse section through an MRI of a Spiny Dogfish Shark (*Squalus acanthias*) showing the location of the "paraspinalis" muscle. The muscle can be identified in situ (1). On the right, the location of the muscle is shown in a schematic diagram (2) and its functional distinctness of the muscle is shown in a schematic diagram (3). Labels: CP = caudal cartilage; CP = gill muscle; SC = supracoracoid cartilage; F = force; F_v = force; M_x = moment; TP = tendon of "paraspinalis" m.; VBV = visceral branch of vagus (X) nerve.






Brigid Reedy Publishes First Book of Original Poetry and Art



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Workforce Development

College Experience

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2026 - 2033

