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# Comparison of Skull Size in Sympatric and Allopatric Fishers (*Martes pennanti*) and American Martens (*Martes americana*)

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**ABSTRACT**

Interactions between two species with similar ranges may cause character displacement, especially if the two species are closely related. There is little research regarding character displacement between two related mammal species. American martens (*Martes americana*) and fishers (*M. pennanti*) are closely related and have some range overlap. I hypothesized that American martens would be smaller in size in locations where they are sympatric to fishers compared to allopatric locations. Also, I hypothesized that fishers would be larger in sympatric locations compared to their allopatric counterparts. To test these hypotheses, I compared the skull sizes of American marten and fisher specimens from locations that were either allopatric or sympatric for both species. The condylobasal length was used to measure the size of each skull. Fisher and marten skulls of both sexes that were found in sympatric locations were, on average, smaller than the skulls from allopatric locations. These differences could be a result of interspecific competition and range overlap between not just fishers and martens, but of other larger carnivores not considered in this study. Fishers and martens could be affecting the average body size of each other's species via interspecific competition. A larger sample size of both species' skulls from more localities could further support these findings.

**TABLE OF CONTENTS**

## INTRODUCTION

Interspecific interactions may have an effect called character displacement for two species that share ranges (Schluter 2000). There is currently little published research examining how overlapping ranges can affect the body size of two closely related species (Weber and Strauss 2016). Some bird species have been shown to be larger in body size where congeners are absent from their range (Norberg and Norberg 2015); however, there is limited research examining mammal species. American martens (*Martes americana*) and fishers (*M. pennanti*) are closely related species in the Mustelidae family and have large, overlapping ranges across continental North America. They have similar diets and likely compete for resources where they share a range. Because martens are the smaller of the two species, it is hypothesized that fishers will outcompete them for the shared resources and therefore martens in sympatric populations are likely to be smaller than martens that are allopatric. Also, because sympatric fishers have to compete for resources with martens, it is hypothesized that sympatric fishers may shift their diets to larger prey items and therefore evolve to be larger on average.

### *Habitat Use*

In a broad sense, fishers and martens inhabit conifer-dominated forests that have overhead cover to protect themselves from predatory raptors and provides habitat for many prey species (Buskirk and Powell 1994). These forest habitats differ between the eastern and western regions of North America. In western North America, the drier climate increases the chance of fires. In the east there is a more temperate climate that causes fewer forest fires (Thomas et al. 1988). Fishers in the west tend to be associated with riparian areas and martens tend to select mesic, late-successional forested areas, which are less prone to fires. Martens and fishers in the east are less selective of microhabitats (Powell et al. 2003). This selectivity with regards to habitats in the western ranges of the United States can negatively affect some marten and fisher populations. Logging can cause marten and fisher mortality because both species rely on conifer-dominated forests and are not known to migrate out of these environments even when the habitat is damaged (Buskirk and Powell 1994). The USDA Forest Service determined that there have been downward trends in marten populations in regions within California and the Rocky Mountains, possibly due to logging in the regions (USDA 2003).

Martens and fishers prioritize selecting resting sites over foraging sites. During mating seasons, habitat selection for denning sites is strongest for both species (Powell 1994; Powell et al. 2003). Martens base their activity patterns on the activity of whatever prey species is dominant in an area (Zielinski 2000). For example, martens are much more active during the day in areas dominated by snowshoe hares (*Lepus americanus*), which are diurnal (Spencer and Zielinski 1983). Fishers are typically crepuscular year-round but their activity patterns can change based on mating seasons (Powell et al. 2003).

***Dietary Overlap***

Martens and fishers are closely related and share similar habitats in North American boreal forests. It is likely that in regions where there are sympatric populations, the two species might compete for the same resources. Trappers interviewed by Suffice et al. (2017) spoke about how both species share a similar "pantry" of resources. Zielinski and Duncan (2004) confirmed that the diets of sympatric populations of fishers and martens have much overlap. Both species have very generalist diets; they consume prey from five major food categories (Aves, Reptilia, Mammalia, Plantae, and Insecta) at similar frequencies (Zielinski and Duncan 2004). In certain parts of their ranges, martens and fishers will also consume amphibians

(Cumberland et al. 2001; Golightly et al. 2006). They are proficient hunters and can kill prey items larger than themselves but will readily scavenge for carrion if the food supply is low, especially in the winter months (Powell et al. 2003). Also, despite fishers' size advantages over martens, there is no indication that fishers consumed larger prey species in sympatric locations (Zielinski and Duncan 2004). However, fishers may be preying on the larger individuals of the same prey species to avoid competition. This may be because martens and fishers use similar foraging methods for the same prey items (Clark et al. 1987).

Both species have cursorial and arboreal hunting abilities that allow them to access the same prey items like squirrels and mice (Clark et al. 1987). There are two common types of foraging shared by the two species. Area-restricted search is used to surprise prey and involves "zigzagging" between the prey's temporary refuges to corner it. Once the prey is stuck in a refuge, martens and fishers can wait for hours to ambush the prey when it tries to leave the refuge (Spencer and Zielinski 1983). Directional search involves chasing and overtaking prey quickly (Powell et al. 2003). These methods work well for capturing fast-moving rodents and lagomorphs that are major parts of both species' diets.

***Interspecific Killings***

Interspecific killing is very common among mammalian Carnivorans. In some cases, almost two-thirds of all known mortalities of a species are due to killing by another carnivore (Palomares and Caro 1999). Donadio and Buskirk (2006) argued that interspecific killing between Carnivorans is most common in ecosystems where the smaller predator is close enough in size to the larger predator that it could use similar resources and be a significant ecological competitor. However, the two Carnivorans could not be so close in size that the larger predator would risk injury from the smaller predator. On average, fishers weigh about three kilograms and martens rarely weigh more than one kilogram (Powell et al. 2003). This weight ratio indicates the potential for an increase in the frequency and intensity of killings and for it to reach a maximum when the larger Carnivoran is two to five times larger than the smaller Carnivoran (Donadio and Buskirk 2006). Fishers are known to attack and kill animals that are larger than themselves like porcupines (*Erethizon dorsatum*). A fisher would likely be able to kill a marten a third of its size if a marten was encroaching on the fisher's resources.

Suffice et al. (2017) examined the diets of fishers and martens by taking testimonies of local trappers from regions with sympatric marten and fisher populations. The trappers stated that fishers would sometimes prey directly on martens. They based this on fisher tracks that were found around trapped marten carcasses and other marten carcasses that appeared to have been chased down by fishers. The testimonies were used to map out a food web with martens and fishers at the axes. Fishers were the only mammal species in the food web that showed any evidence of equally preying on adult and young martens (Suffice et al. 2017). Fishers only actively hunt martens during the winter months, when other prey items are scarce (McCann et al. 2010). Because the two species have similar diets, the reduced variety of prey items in the winter could increase the frequency of interaction between martens and fishers, which could lead to the larger fisher killing the marten for sustenance.

Schluter (2000) hypothesized that character displacement in sympatric populations of carnivores are evolutionary responses to interspecific killing. Character displacement could differ between sympatric fishers and allopatric fishers. If fishers are killing martens, they could reduce competition for resources and in turn consume more nutrients by eating martens. If this is the case, then sympatric martens may show different characteristics than their allopatric relatives.

***Mesopredator Release***

Mesopredator release is a phenomenon that occurs when higher-trophic predators are absent from an ecosystem. This absence causes the populations of smaller predators ("mesopredators") within the ecosystem to increase and expand into the trophic position of the absent top-predator (Ritchie and Johnson 2009). Fishers have been shown to experience mesopredator release in areas where there are fewer higher-trophic predator species like bobcats (*Lynx rufus*) and mountain lions (*Puma concolor*) (LaPoint et al. 2014; Wengert et al. 2014). Fisher specimens were measured from specific regions of North America (East, Central, Northwest, Pacific) where the larger apex predators like mountain lions, wolves, and bobcats, were extirpated. The fishers in locations with higher-trophic predators (Central, Northwest, Pacific) were on average smaller than fishers in the East region. The eastern fishers were also the only group that showed an increase in skull size over time (LaPoint et al. 2014). Mountain lions and wolves are not found in the eastern United States so the larger eastern fishers likely had to compete with fewer predators. In turn, the chances of a larger individual surviving to reproduce would be much greater than a smaller individual. Coyotes (*Canis latrans*), which are very common in eastern North America, were ruled out as viable fisher predators because coyotes rarely showed any evidence of attacking or killing fishers (Wengert et al. 2014). Allopatric martens may experience mesopredator release because they do not have to compete with the larger-bodied fishers for their shared resources. This could give the martens greater access to prey that would otherwise be consumed by fishers. Therefore, martens with larger body sizes may be more successful and reproduce more frequently in areas allopatric to fishers. Over time, this could lead to allopatric marten populations with larger average skull and body size. Conversely, allopatric fishers may have easier access to prey when compared to sympatric fishers due to the lack of competition from martens. This could allow allopatric individuals to have more generalist diets and reduce the need to grow larger in order to capitalize on the larger prey items in sympatric locations. Therefore, sympatric fishers will likely be larger on average than their allopatric counterparts.

The combined effects of dietary and habitat overlap, interspecific killing, and mesopredator release may cause character displacement, specifically changes in body size, in sympatric American martens and fishers. To investigate this, I measured the condylobasal length of fisher and marten skulls from allopatric and sympatric localities. Evidence of differing skull sizes between allopatric and sympatric specimens could suggest that fishers and martens are having a characteristic effect on each other via interspecific interactions or a lack thereof. To test these hypotheses, I compared the skull sizes of marten and fisher specimens from locations that were either allopatric or sympatric.

**METHODS**

I measured the condylobasal (CB) length of marten and fisher skull specimens stored at the University of Connecticut as well as specimens shipped from the biological collections facilities of multiple institutions across the United States. Skulls of both sexes were measured from the premaxilla just above the teeth to the center of the occipital condyle. This measurement is used as a proxy for body size because a full head-and-body length needs to be estimated from field measurements but CB length can be measured more directly and it is easier to measure the CB length of a larger number of specimens (Dayan et al. 1989). Age was not taken into account for any specimen because the age of most of the specimens I measured was unknown. Before measurement, I recorded the sex of the specimen and the location it was found in (state, town/landmark). I estimated the latitude and longitude of each location using Google Maps and recorded it. Each skull was also examined to check if there was any chipping or fractures of the occipital condyles, premaxilla, or base of the skull. If there was damage to any of these parts of the skull, a measurement was estimated but the estimations were not included in the sample. A standard pair of digital calipers was used for all measurements.

Measurements of skulls from the same population are likely not to represent independent samples. Therefore, I averaged CB length of specimens within each locality. I also averaged measurements by sex to get a basis for the size of a typical specimen by sex and to help sex any unknowns. To determine the sex of any specimens for whom sex had not been determined, I checked 95% confidence intervals of the average CB length of specimens of previously identified males and females from the same locality. If a specimen's CB length fell within the 95% confidence interval for male skull sizes from that locality, I concluded it was a male. If it fell within the 95% confidence interval for the female skulls, I concluded it was a female. If the measurement of an unknown specimen fell outside of the confidence intervals of both sexes, I removed it from the data set. I also removed any very large females or very small males, which could be attributed to mislabeling at capture. The 95% confidence intervals for males and females of both species did not overlap with each other so I was able to make this assumption.

***Statistical Analysis***

I used linear regression to model CB length as a response to overlap (sympatric or allopatric) to determine if there is a difference in average CB length between sympatric populations and allopatric populations. I also considered the impacts of two confounding variables that could affect the response, latitude and sex, by including them as covariates in the linear models. Using ProgramR version 3.4.3 (R Development Core Team 2017), I ran linear regression models treating CB length (averaged by town and sex) as a response to overlap, latitude, and sex. I tested for statistical significance for interactions between the three covariates (all two-way and three-way interactions) to determine if there was an additive effect between any of them. A positive, statistically significant effect of allopatry on CB length for martens would indicate that martens may be larger on average in localities that are not shared with fishers. Also, a positive, statistically significant effect of sympatry on CB length for fishers would indicate that fishers may be larger on average in localities shared with martens.

**RESULTS**

There were 1566 skulls measured for CB length from 625 localities. When averaged by sex and locality the final models included four data points: Male and female fishers and male and female martens. The impacts of all the interactions were found to be insignificant and were left out of the final models. When the specimens were analyzed by sex (including unknown sex), CB length was negatively related to sympatry for both male and female martens (coefficient of overlap= -0.65, t-value= -0.70, $p < 0.001$; Figure 1). Removing the three individual martens with unknown sex from the final analysis led to very little change in statistics. There were no measured marten specimens that were sympatric to fishers and had unknown sex. The model of marten CB length suggests that individuals in sympatric populations had smaller CB lengths.

For male and female fishers, there is also a negative relationship between CB length and sympatry (coefficient of overlap= -1.60, t-value= -3.75, $p < 0.001$; Figure 1). When the data is analyzed without the 11 individuals with unknown sex, the statistical analysis does not significantly change. All unknown fisher specimens were from sympatric locations. The model of fisher CB length suggests that individuals in sympatric populations had smaller CB lengths.

When the average CB lengths of allopatric and sympatric martens and fishers is plotted with a 95% confidence interval, the error bars are small for all observations, especially for the fisher data (Figure 1). This could be because the error bars are being underestimated. Model diagnostic plots suggest that variance may have been underestimated by using a Normal Q-Q Model, especially for fishers. The Normal Q-Q plot for martens without unknowns (Figure 2) is linear which indicates that the unknowns do not skew the marten data. The Normal Q-Q plots for my fisher data have many more outliers than the plots for my marten data (Figure 3). When fishers of unknown sex are removed from the analysis, there are fewer skewed points that could impact the data.

There was also a relationship between latitude and average body size. When average CB length per locality is plotted against the latitude of each locality, there is a clear positive trend for males and females of both species (t-value= -3.48, $p<0.001$, Figure 4). Surprisingly, the coefficient estimate for latitude was 0.38 for both sexes of fishers and martens. Factoring in the range of latitudes from the specimens, this estimate suggests that fishers and martens from higher latitudes could have CB lengths that are almost 10 millimeters larger on average than the lower latitude counterparts (Figure 4).

**DISCUSSION**

The results of this study suggest that there is a significant difference between the size of sympatric fishers and martens compared to their allopatric counterparts. Although my sample size of martens and fishers only contained specimens from some parts of the species' ranges, character displacement does appear to occur for the two species when in sympatry as evidenced by Schluter (2000). While these results are not definitive for all sympatric fisher and marten populations across North America, these findings are likely a good representation for the sympatric populations measured in this study.

The result that sympatric fishers were smaller was unexpected. Although the reason that the sympatric fishers were smaller than allopatric fishers is unknown, food availability may be a factor. As mentioned before, fishers and martens have very similar diets (Zielinski and Duncan 2004) and likely will compete for shared resources in sympatric locations. If both species are competing for the same prey items, then the larger-bodied individuals of each species may not be able to meet their energetic needs. Larger-bodied carnivores typically have higher metabolic rates than a smaller Carnivoran of the same species (McNab 1992). The larger individuals need to consume larger quantities of food in order to match their higher metabolisms. However, with increased inter- and intra-specific competition for resources, the larger fishers may not consume the amount of food they need to be successful and reproduce. Manlick et al. (2017) found that reintroduced populations of martens and fishers experience significant niche overlap. This could allow the smaller individuals who require less food to successfully reproduce at a greater rate, which would produce a larger number of smaller-bodied fishers, decreasing the average body size in a sympatric population.

Furthermore, in sympatric locations, there may be other overlapping predators that are larger than both fishers and martens and may influence body and skull size of the two species. Wengert et al. (2014) found that multiple large predators prey upon fishers including bobcats, mountain lions, wolverines (*Gulo gulo*), Canada lynx (*Lynx canadensis*), and other fishers. The predator species varied based on the region but the largest predators (mountain lions) only inhabit the western part of the fisher's range. Fishers and martens both inhabit this area so it is possible that predators like mountain lions could influence the characters of both species through interspecific killing and competition. To explore this possibility in future studies, the size of fisher and marten specimens from the western ranges could be compared to the size of specimens from regions with fewer large predators.

Because both martens and fishers are smaller on average in sympatric locations, it may be important to focus conservation efforts on sympatric populations of both species, especially martens. The survival of individuals of a species correlates with average body size (Sauer and Slade 1987). Also, Stearns (1983) confirmed that lifespan is allometrically scaled to body size so the smaller sympatric martens and their smaller young could die earlier than their larger, allopatric counterparts. If this is the case, it could explain why some marten populations have experienced downward trends despite being in protected lands (USDA 2003). This should be a cause for concern for sympatric marten conservation. The marten is considered a “sensitive” species by the U.S. Forest Service and in some states like California, is a “Species of Special Concern” (Harris and Ogan 1997). However, the marten is not protected under the Endangered Species Act and no major conservation efforts for the species have taken place. Because of this, some sympatric marten populations could be at risk of population decline if their average body size is relatively small. Also, according to the U.S. Department of Agriculture, about 65% of martens’ and fishers’ ranges are found on public lands (Ruggiero et al. 1994). This could increase the mortality risk of both species due to increased deforestation in these areas.

Gathering skull measurements from specimens that inhabited locations not in this study could further support my findings that both fishers and martens are smaller on average when they share ranges and habitats. Fisher and marten ranges extend across North America and my sample size was limited to the Northeast United States, the northern Midwest United States, Labrador, British Columbia, and Alaska. Measuring specimens from other parts of the species' ranges could reveal different body size variations between allopatric and sympatric populations.

***Limitations***

My study consisted of 1566 observations but a majority of them were fisher specimens (n=1397). The limited sample size of martens may not be an accurate representation of average skull size, especially because I did not have samples from localities all across the marten's range. My marten samples were also made up of multiple subspecies (*M. a. americana*, *M. a. brumalis, M. a. caurina*, *M. a. vulpina*) however most of the samples did not have a subspecies designation. Hagmeier (1958) found that condylobasal length differs between some marten subspecies, which could skew my results because my sample size of *M. a. brumalis* was much larger than any other known subspecies in my study.

Bergmann's Rule is also an important factor to consider with regards to my data. The rule says that individuals of an animal species will have larger average body size at higher latitudes. Past studies have indicated that both fishers and American martens tend to be larger on average at higher latitudes (Meiri et al. 2007). The range of American martens stretches farther north than the fisher's range so it is possible that the martens from the northern allopatric locations could naturally be larger which could skew my results. My data shows that the martens found in Labrador, specifically *M. a. brumalis*, were much larger on average than martens found in higher altitudes like Alaska. However, the specimen sample sizes from both locations were relatively small. More marten specimens from both Alaska and Labrador should be measured in order to have more conclusive evidence of Bergmann's Rule.

### *Conclusions*

Males and females of both species had smaller average condylobasal lengths in sympatric populations. This difference in marten body size could be attributed to interspecific competition between martens and fishers when the two species overlap. The reduction in body size for sympatric fishers was unexpected as I hypothesized that sympatric fishers might prey on larger individuals of a prey species and, in turn, grow larger on average. This unexpected result could be attributed to interspecific competition between sympatric martens and fishers or the presence of other larger predators that better benefits the smaller-bodied individuals. Also, preliminary data from this study suggests that latitude may have a significant positive effect on condylobasal length of both species (Figure 2). This indicates that Bergmann's Rule may have an influence on the results of this study. Further research should be done examining the possible mechanisms that could cause such a shift in body size for both species.

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**TABLES AND FIGURES**

**Table 1** Sample sizes of fisher and marten skulls organized by sex and source collection.

| **Source Collection** | **Fisher** | | | **Marten** | | |
|---|---|---|---|---|---|---|
| | **Male** | **Female** | **Unknown*** | **Male** | **Female** | **Unknown*** |
| **Museum of Comparative Zoology** | **29** | **35** | | **56** | **51** | **3** |
| **University of Alaska-Fairbanks** | | | | **14** | **6** | |
| **University of Connecticut** | **530** | **720** | **7** | | | |
| **University of Massachusetts-Amherst** | **8** | **43** | **6** | | | |
| **University of Michigan Museum of Zoology** | **12** | **5** | | **11** | **7** | |
| **University of Wyoming Museum of Vertebrates** | | | | **8** | **15** | |

*****Unknowns were removed from final analysis

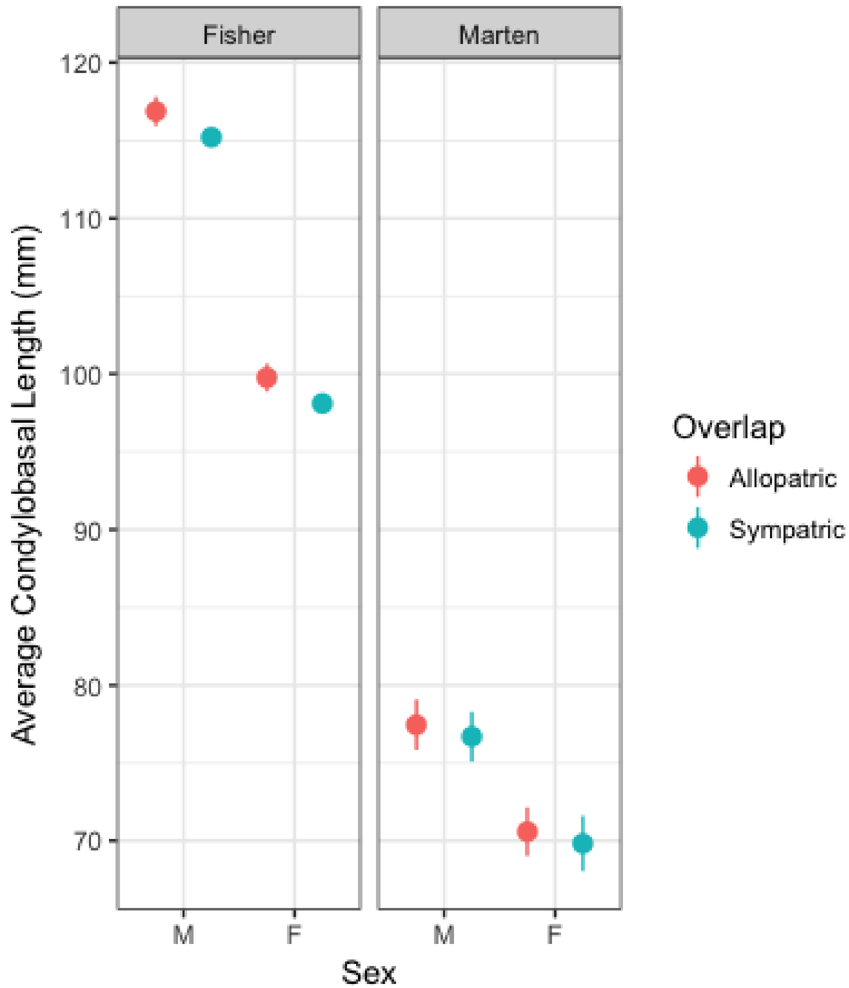


**Figure 1** The average condylobasal length in sympatric and allopatric populations of fishers and martens, accounting for known sex.

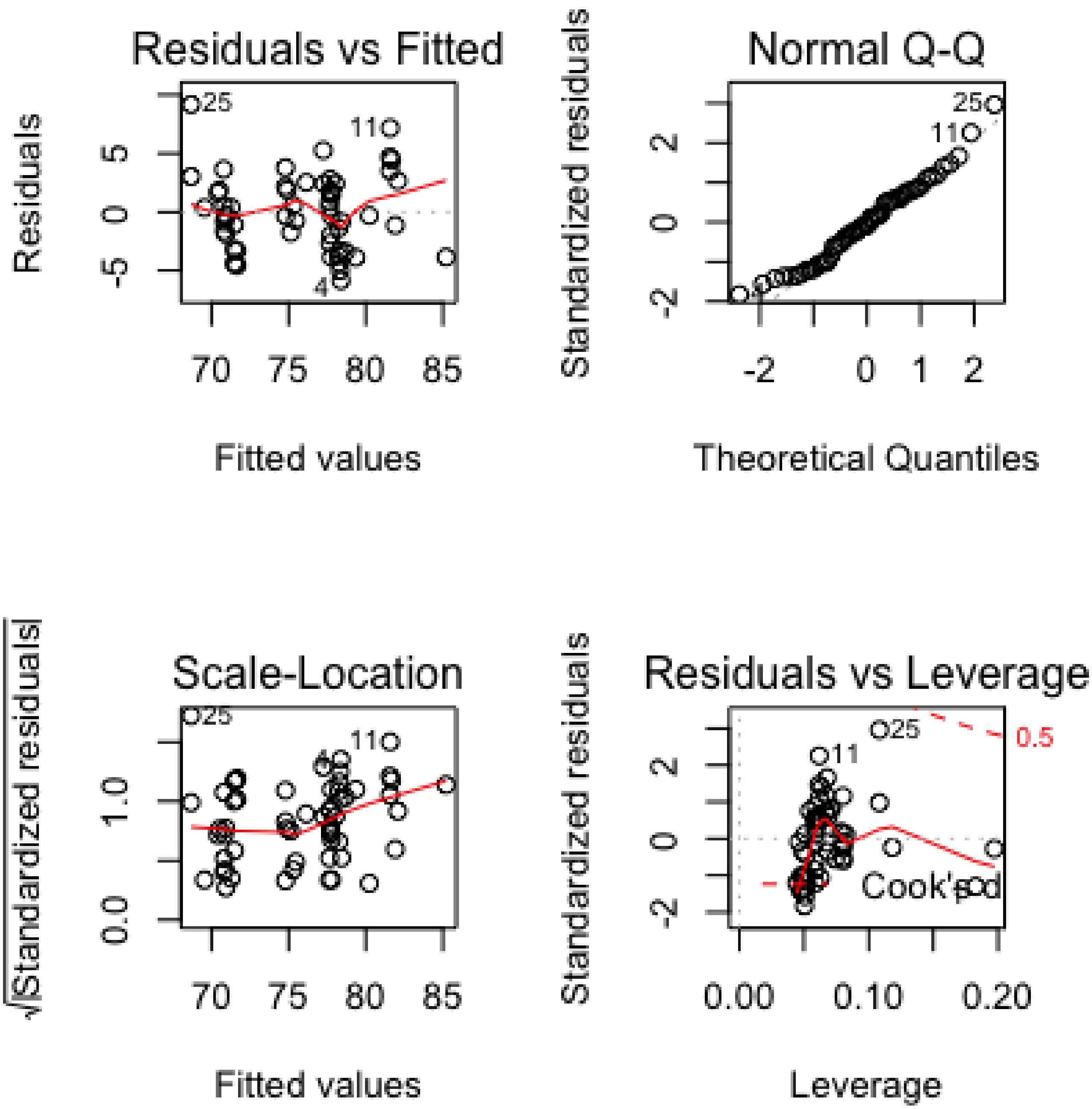


**Figure 2** Diagnostic plots of marten data without unknowns

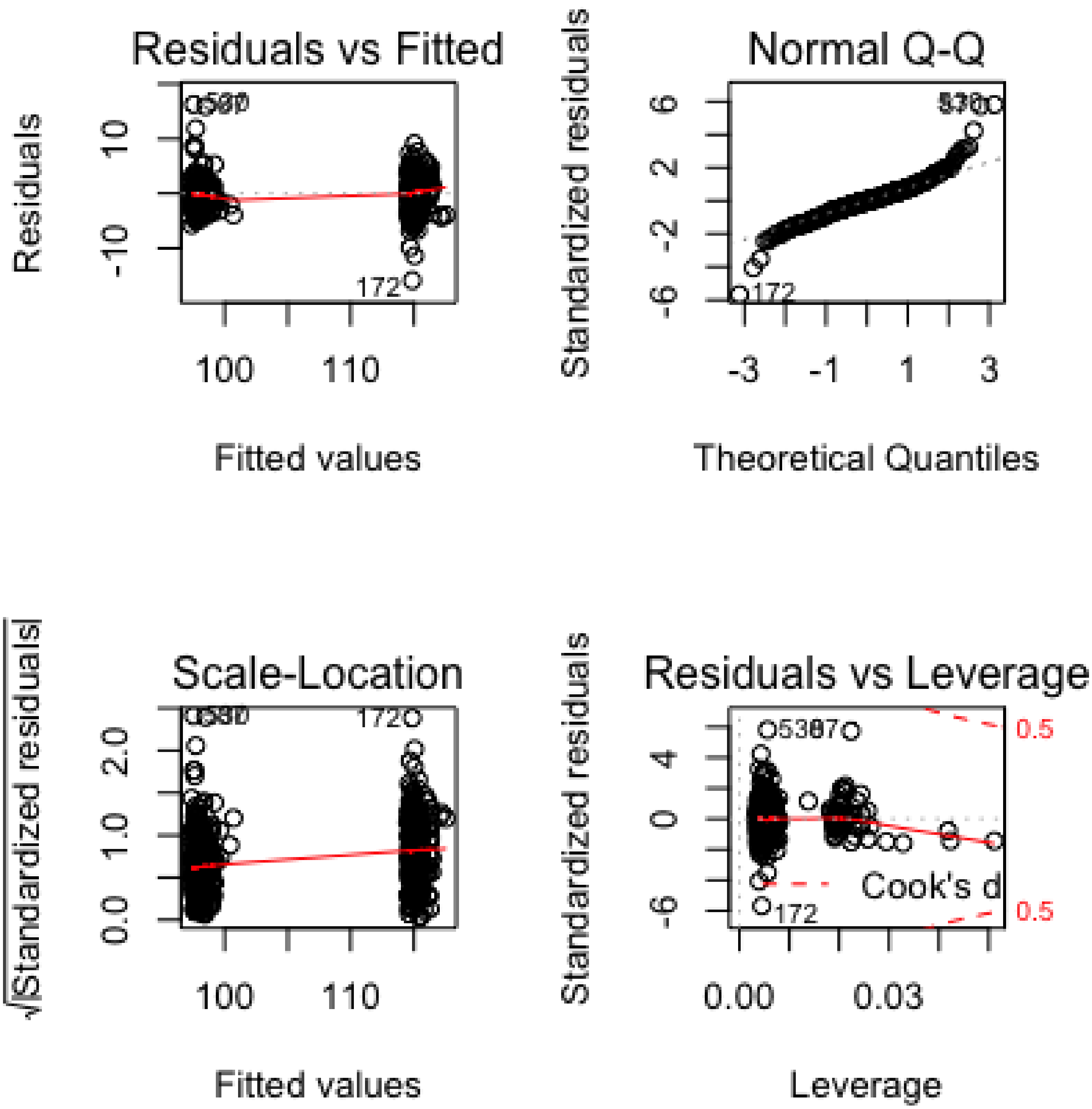


**Figure 3** Diagnostic plots of fisher data without unknowns

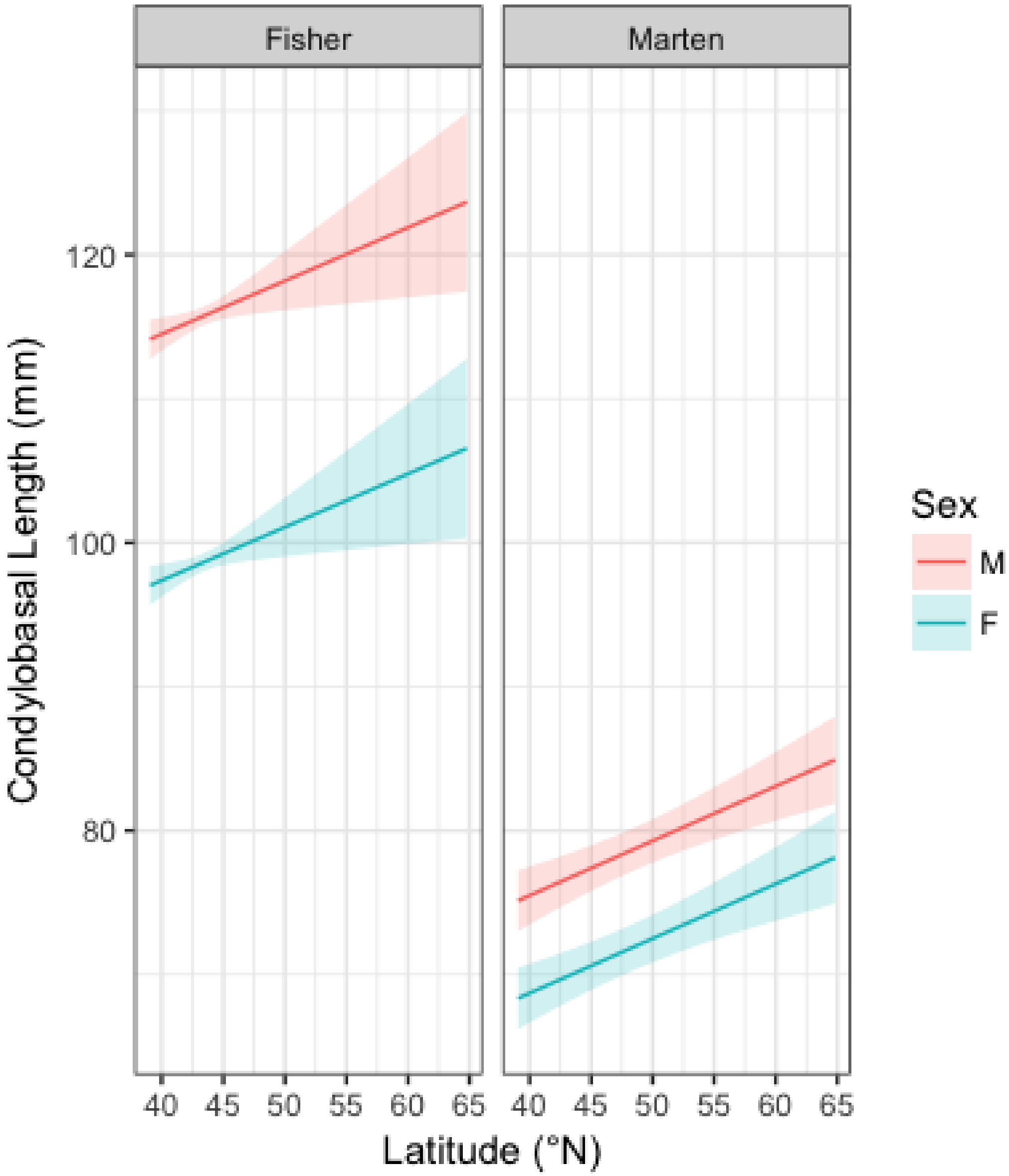


**Figure 4** The effect of latitude on CB length for males and females of both fishers and martens.

**MATERIALS EXAMINED**

*Martes americana*.- University of Alaska Museum of the North (UAM) 53425, 81.93 mm, M; UAM 53426, 82.87 mm, M; UAM 53478, 72.75 mm, F; UAM 53480, 81.31 mm, M; UAM 53482, 81.83 mm, M; UAM 53486, 81.34 mm, M; UAM 53487, 81.25 mm, M; UAM 53488, 81.91 mm, M; UAM 53489, 75.17 mm, M; UAM 53495, 80.85 mm, M; UAM 53496, 82.63 mm, M; UAM 53675, 73.49 mm, F; UAM 53676, 81.11 mm, M; UAM 53678, 82.69 mm, M; UAM 53680, 83.76 mm, M; UAM 53681, 72.56 mm, M; UAM 53682, 74.27 mm, F; UAM 53683, 73.64 mm, F; UAM 53684, 74.08 mm, F; UAM 53685, 72 mm, F; University of Wyoming Museum of Vertebrates (UWYMV) 2294, 77.15 mm, F; UWYMV 2297, 85.72 mm, F; UWYMV 2298, 73.86 mm, F; UWYMV 2299, 81.37 mm, M; UWYMV 2300, 75.5 mm, F; UWYMV 2309, 75.94 mm, F; UWYMV 2574, 82.52 mm, M; UWYMV 2575, 82.7 mm, M; UWYMV 2577, 80.98 mm, M; UWYMV 2578, 81.1 mm, M; UWYMV 2580, 74.11 mm, F; UWYMV 2581, 72.77 mm, F; UWYMV 2582, 72.65 mm, F; UWYMV 2583, 72.04 mm, F; UWYMV 2584, 71.63 mm, F; UWYMV 2585, 72.04 mm, F; UWYMV 2586, 74.03 mm, M; UWYMV 2707, 77.25 mm, M; UWYMV 2708, 77.86 mm, F; UWYMV 2751, 71.71 mm, F; UWYMV 2752, 72.21 mm, M; UWYMV 3987, 71.05 mm, F; UWYMV 912, 69.91 mm, F.

*Martes americana americana*.- MCZ 59687, 72.08 mm, M; MCZ 59688, 76.18 mm, M; MCZ 59689, 67.23 mm, M; MCZ 59699, 75.87 mm, M; MCZ 59700, 78.35 mm, M; MCZ 59702, 75.04 mm, M; MCZ 59735, 78.07 mm, M; MCZ 60073, 66.51 mm, F; MCZ 60074, 67.16 mm, F; MCZ 60075, 75.04 mm, M; MCZ 60614, 67.65 mm, F; MCZ 60616, 73.3 mm, M; MCZ 60875, 70.39 mm, F; MCZ 60876, 76.88 mm, M; MCZ 60877, 68.27 mm, F; MCZ 60878, 73.97 mm, M; MCZ 61110, 78.67 mm, M; MCZ 62986, 68.36 mm, F; MCZ 62987, 73.35 mm, M; MCZ 62988, 66.49 mm, F; MCZ 62989, 67.7 mm, F; MCZ 62990, 72.55 mm, M; UMMZ 176288, 74.99 mm, M; UMMZ 176289, 75.76 mm, M; UMMZ 176290, 79.46 mm, M; UMMZ 176291, 79.41 mm, M; UMMZ 176292, 73.92 mm, M; UMMZ 176293, 79.24 mm, M; UMMZ 176294, 77.43 mm, M; UMMZ 176305, 74.44 mm, F; UMMZ 176306, 71.33 mm, F; UMMZ 176308, 69.22 mm, F; UMMZ 176309, 69.99 mm, F; UMMZ 176310, 78.53 mm, M; UMMZ 176311, 70.33 mm, F; UMMZ 176312, 80.5 mm, M; UMMZ 177756, 79.57 mm, M; UMMZ 177760, 70.71 mm, F; UMMZ 177768, 69.04 mm, F; UMMZ 177795, 78.01 mm, M.

*Martes americana brumalis*.- MCZ BOM-7376, 77.66 mm, F; MCZ BOM-7377, 75.49 mm, F; MCZ BOM-7378, 81.84 mm, U; MCZ BOM-7379, 86.02 mm, M; MCZ BOM-7380, 76.26 mm, F; MCZ BOM-7381, 78.38 mm, F; MCZ BOM-7382, 77.88 mm, F; MCZ BOM-7383, 72.3 mm, F; MCZ BOM-7384, 88.52 mm, M; MCZ BOM-7385, 73.94 mm, F; MCZ BOM-7386, 96.11 mm, M; MCZ BOM-7388, 76.18 mm, F; MCZ BOM-7389, 74.11 mm, F; MCZ BOM-7390, 75.24 mm, F; MCZ BOM-7391, 84.17 mm, M; MCZ BOM-7392, 79.99 mm, F; MCZ

BOM-7393, 87.53 mm, M; MCZ BOM-7394 , 84.48 mm, M; MCZ BOM-7395, 85.66 mm, M; MCZ BOM-7396, 88.26 mm, M; MCZ BOM-7485, 85.69 mm, M; MCZ BOM-7486, 76.14 mm, F; MCZ BOM-7487, 84.94 mm, M; MCZ BOM-7488, 83.89 mm, M; MCZ BOM-7489, 76.51 mm, F; MCZ BOM-7490, 75.9 mm, F; MCZ BOM-7491, 78.98 mm, F; MCZ BOM-7492, 78.29 mm, F; MCZ BOM-7493, 76.19 mm, F; MCZ BOM-7494, 85.2 mm, M; MCZ BOM-7495, 77.07 mm, F; MCZ BOM-7496, 85.31 mm, M; MCZ BOM-7497, 86.4 mm, M; MCZ BOM-7498, 75.79 mm, F; MCZ BOM-7499, 74.86 mm, F; MCZ BOM-7500, 76.29 mm, F; MCZ BOM-7501, 79.12 mm, F; MCZ BOM-7502, 75.87 mm, F; MCZ BOM-7503, 82.35 mm, U; MCZ BOM-7504, 84.32 mm, M; MCZ BOM-7505, 85.19 mm, M; MCZ BOM-7507, 75.93 mm, F; MCZ BOM-7508, 86.92 mm, M; MCZ BOM-7509, 84.97 mm, M; MCZ BOM-7510, 78.42 mm, F; MCZ BOM-7511, 86.87 mm, M; MCZ BOM-7513, 76.31 mm, F; MCZ BOM-7514, 84.9 mm, M; MCZ BOM-7515, 83.22 mm, M; MCZ BOM-7516, 75.38 mm, F; MCZ BOM-7517, 78.45 mm, F; MCZ BOM-7518, 86.37 mm, M; MCZ BOM-7519, 76.64 mm, F; MCZ BOM-7520, 89.62 mm, M; MCZ BOM-7521, 86.09 mm, M; MCZ BOM-7522, 76.92 mm, F; MCZ BOM-7523, 78.39 mm, F; MCZ BOM-7524, 75.37 mm, F; MCZ BOM-7525, 85.94 mm, M; MCZ BOM-7526, 81.26 mm, U; MCZ BOM-7527, 75 mm, F; MCZ BOM-7529, 77.79 mm, F; MCZ BOM-7530, 85.53 mm, M; MCZ BOM-7531, 78.64 mm, F; MCZ BOM-7532, 86.37 mm, M; MCZ BOM-7533, 86.24 mm, M; MCZ BOM-7534, 84.91 mm, M; MCZ BOM-7535, 87.48 mm, M; MCZ BOM-7536, 86.09 mm, M; MCZ BOM-7537, 85.63 mm, M; MCZ BOM-7538, 77.16 mm, F; MCZ BOM-7539, 76.18 mm, F; MCZ BOM-7540, 84.68 mm, M; MCZ BOM-7541, 82.6 mm, M; MCZ BOM-7542, 76.42 mm, F; MCZ BOM-7543, 85.63 mm, M; MCZ BOM-7544, 77.65 mm, F; MCZ BOM-7545, 74.65 mm, F.

*Martes americana caurina*.- MCZ B5538, 79.94 mm, M; MCZ B5538, 79.94 mm, M; MCZ B5539, 75.66 mm, M; MCZ B5539, 75.66 mm, M; MCZ B5540, 75.31 mm, M; MCZ B5540, 75.31 mm, M.

*Martes americana vulpina*.- MCZ 41386, 80.49 mm, M; MCZ 41387, 78.15 mm, M; MCZ 41388, 71.67 mm, F; MCZ 41405, 70.19 mm, F; MCZ 41406, 78.27 mm, M; MCZ 41407, 72.28 mm, F.

*Martes pennanti*.- University of Connecticut (UCONN) 20839, 124.33 mm, M; UCONN 20840, 117.2 mm, M; UCONN 20848, 95.22 mm, F; UCONN 20862, 96.54 mm, F; UCONN 21028, 96.63 mm, F; UCONN 21029, 95.64 mm, F; UCONN 21030, 98.55 mm, F; UCONN 21031, 117.64 mm, M; UCONN 21032, 94.91 mm, F; UCONN 21033, 98.78 mm, F; UCONN 21034, 99.72 mm, F; UCONN 21035, 99.77 mm, F; UCONN 21036, 97.57 mm, F; UCONN 21037, 117.32 mm, M; UCONN 21038, 99.36 mm, F; UCONN 21039, 99.15 mm, F; UCONN 21040, 97.3 mm, F; UCONN 21041 , 98.17 mm, F; UCONN 21042, 96.41 mm, F; UCONN 21043, 95.01 mm, F; UCONN 21044, 114.95 mm, M; UCONN 21045, 98.52 mm, F; UCONN 21046, 115.77 mm, M; UCONN 21047, 96.27 mm, F; UCONN 21048, 95.95 mm, F; UCONN 21049, 97.73 mm, F; UCONN 21050, 97.78 mm, F; UCONN 21052, 100.46 mm, F; UCONN 21053, 100.53 mm, F; UCONN 21054, 98.41 mm, F; UCONN 21055, 99.01 mm, F; UCONN 21056, 100.53 mm, F; UCONN 21057, 116.51 mm, F; UCONN 21058, 116.51 mm, M; UCONN 21059, 119.4 mm, M; UCONN 21060, 115.07 mm, M; UCONN 21061, 101.59 mm, F; 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UCONN 23858, 116.21 mm, M; UCONN 23859, 96.94 mm, F; UCONN 23860, 116.5 mm, M; UCONN 23861, 98.39 mm, F; UCONN 23862, 100.69 mm, F; UCONN 23863, 96.86 mm, F; UCONN 23866, 117.96 mm, M; UCONN 23867, 120.02 mm, M; UCONN 23868, 116.84 mm, M; UCONN 23869, 118.37 mm, M; UCONN 23870, 111.71 mm, M; UCONN 23871, 116.63 mm, M; UCONN 23874, 97.72 mm, F; UCONN 23875, 114.34 mm, M; UCONN 23876, 112.41 mm, M; UCONN 23878, 113.59 mm, M; UCONN 23879, 98.94 mm, F; UCONN 23880, 98.88 mm, F; UCONN 23881, 99.99 mm, F; UCONN 23882, 99.27 mm, F; UCONN 23883, 98.58 mm, F; UCONN 23884, 114.77 mm, M; UCONN 23885, 113.81 mm, M; UCONN 23886, 117.62 mm, M; UCONN 23887, 96.05 mm, F; UCONN 23888, 101.48 mm, F; UCONN 23890, 117.45 mm, M; UCONN 23892, 117.46 mm, M; UCONN 23893, 95.51 mm, F; UCONN 23894, 99.22 mm, F; UCONN 23895, 99.57 mm, F; UCONN 23896, 111.64 mm, M; UCONN 23897, 101.85 mm, F; UCONN 23898, 100.07 mm, F; UCONN 23899, 99.24 mm, F; UCONN 23900, 103.18 mm, F; UCONN 23901, 113.04 mm, M; UCONN 23902, 96.43 mm, F; UCONN 23903, 115.02 mm, M; UCONN 23905, 99.63 mm, F; UCONN 23906, 96.88 mm, F; UCONN 23915, 95.86 mm, F; UCONN 23917, 118.87 mm, M; UCONN 23918, 96.91 mm, F; UCONN 23919, 113.05 mm, M; UCONN 23920, 113.62 mm, M; UCONN 23921, 108.89 mm, M; UCONN 23922, 118.75 mm, M; UCONN 23923, 108.44 mm, M; UCONN 23925, 114.2 mm, M; UCONN 23926, 99.1 mm, F; UCONN 24021, 115.55 mm, M; UCONN 24023, 96.7 mm, F; UCONN 24024, 106.32 mm, M; UCONN 24025, 97.88 mm, F; UCONN 24026, 117.14 mm, M; UCONN 24027, 97.44 mm, F; UCONN 24028, 108.34 mm, M; UCONN 24030, 114.74 mm, M; UCONN 24032, 94.77 mm, F; UCONN 24033, 97.7 mm, F; UCONN 24034, 100.3 mm, F; UCONN 24036, 114.76 mm, M; UCONN 24037, 94.9 mm, F; UCONN 24038, 106.81 mm, M; UCONN 24039, 93.13 mm, F; UCONN 24041, 100.91 mm, F; UCONN 24042, 118.31 mm, M; UCONN 24043, 117.29 mm, M; UCONN 24044, 98.11 mm, F; UCONN 24045, 116.3 mm, M; UCONN 24047, 114.72 mm, M; UCONN 24048, 111.98 mm, M; UCONN 24049, 95.06 mm, F; UCONN 24050, 97.45 mm, F; UCONN 24052, 115.2 mm, M; UCONN 24055, 112.32 mm, M; UCONN 24056, 117.52 mm, U; UCONN 24057, 96.2 mm, F; UCONN 24058, 99.08 mm, F; UCONN 24059, 111.43 mm, M; UCONN 24060, 111.44 mm, M; UCONN 24061, 95.64 mm, F; UCONN 24062, 119.29 mm, M; UCONN 24063, 97.63 mm, F; UCONN 24064, 120.42 mm, M; UCONN 24065, 115.39 mm, M; UCONN 24066, 96.17 mm, F; UCONN 24067, 99.1 mm, F; UCONN 24068, 116.19 mm, M; UCONN 24069, 98.54 mm, F; UCONN 24071, 101.01 mm, F; UCONN 24072, 114.92 mm, M; UCONN 24073, 115.3 mm, M; UCONN 24074, 118.05 mm, M; UCONN 24075, 117.02 mm, M; UCONN 24077, 97.18 mm, F; UCONN 24078, 100.33 mm, F; UCONN 24079, 120.64 mm, M; UCONN 24080, 115.43 mm, M; UCONN 24183, 118.67 mm, M; UCONN 24184, 117.12 mm, M; UCONN 24186, 98.1 mm, F; UCONN 24188, 97.03 mm, F; UCONN 24190, 110.17 mm, M; UCONN 24191, 96.56 mm, F; UCONN 24192, 117.86 mm, M; UCONN 24193, 98.03 mm, F; UCONN 24194, 89.86 mm, F; UCONN 24195, 96.38 mm, F; UCONN 24196, 113.35 mm, M; UCONN 24197, 98.25 mm, F; UCONN 24198, 113.79 mm, M; UCONN 24199, 100.12 mm, F; UCONN 24200, 93.94 mm, F;

UCONN 24202, 100 mm, F; UCONN 24205, 96.15 mm, F; UCONN 24207, 98 mm, F; UCONN 24208, 95.14 mm, F; UCONN 24209, 91.5 mm, F; UCONN 24210, 115.91 mm, M; UCONN 24212, 97.84 mm, F; UCONN 24214, 99.19 mm, F; UCONN 24215, 99.92 mm, F; UCONN 24216, 97.97 mm, F; UCONN 24217, 101.33 mm, F; UCONN 24218, 114.84 mm, M; UCONN 24219, 96.99 mm, F; UCONN 24220, 115.98 mm, M; UCONN 24222, 114.31 mm, M; UCONN 24223, 113.88 mm, M; UCONN 24224, 113.9 mm, M; UCONN 24225, 114.96 mm, M; UCONN 24226, 93.98 mm, F; UCONN 24227, 96.08 mm, F; UCONN 24231, 96.3 mm, F; UCONN 24232, 114.16 mm, M; UCONN 24233, 116.09 mm, M; UCONN 24234, 119.79 mm, M; UCONN 24235, 118.31 mm, M; UCONN 24236, 97.21 mm, F; UCONN 24238, 95.45 mm, F; UCONN 24239, 113.85 mm, M; UCONN 24240, 98.98 mm, F; UCONN 24241, 100.75 mm, F; UCONN 24242, 99.44 mm, F; UCONN 24244, 102.23 mm, F; UCONN 24245, 99.9 mm, F; UCONN 24247, 119.4 mm, M; UCONN 24249, 98.56 mm, F; UCONN 24251, 117.59 mm, M; UCONN 24252, 103.53 mm, F; UCONN 24254, 98.28 mm, F; UCONN 24256, 101.44 mm, F; UCONN 24257, 121.67 mm, M; UCONN 24258, 99.28 mm, U; UCONN 24259, 115.68 mm, M; UCONN 24260, 120.77 mm, M; UCONN 24261, 101.89 mm, F; UCONN 24262, 117.38 mm, M; UCONN 24263, 99.88 mm, F; UCONN 24264, 97.07 mm, F; UCONN 24265, 98.76 mm, F; UCONN 24266, 113.02 mm, M; UCONN 24267, 98.5 mm, F; UCONN 24268, 119.2 mm, M; UCONN 24269, 119.35 mm, M; UCONN 24270, 118.28 mm, M; UCONN 24271, 107.82 mm, M; UCONN 24272, 96.45 mm, F; UCONN 24273, 99.87 mm, F; UCONN 24274, 122.94 mm, M; UCONN 24275, 101.2 mm, M; UCONN 24276, 112.86 mm, M; UCONN 24277, 120.05 mm, M; UCONN 24278, 119.2 mm, M; UCONN 24279, 99.21 mm, F; UCONN 24280, 112.01 mm, M; UCONN 24281, 117.71 mm, M; UCONN 24302, 113.55 mm, M; UCONN 24303, 117.28 mm, M; UCONN 24304, 98.25 mm, F; UCONN 24305, 112.4 mm, M; UCONN 24306, 115.14 mm, M; UCONN 24307, 99.58 mm, F; UCONN 24308, 116.55 mm, M; UCONN 24309, 118.49 mm, M; UCONN 24310, 98.35 mm, F; UCONN 24311, 102.75 mm, F; UCONN 24312, 99.15 mm, F; UCONN 24313, 119.78 mm, M; UCONN 24314, 99.5 mm, F; UCONN 24315, 97.54 mm, F; UCONN 24316, 117.63 mm, M; UCONN 24317, 120.33 mm, M; UCONN 24318, 119.48 mm, M; UCONN 24320, 124.14 mm, M; UCONN 24321, 100.42 mm, F; UCONN 24322, 117.24 mm, M; UCONN 24323, 100.74 mm, F; UCONN 24324, 96.32 mm, F; UCONN 24325, 113.82 mm, M; UCONN 24327, 97.7 mm, F; UCONN 24328, 118.78 mm, M; UCONN 24329, 113.96 mm, M; UCONN 24331, 95.32 mm, F; UCONN 24332, 99.34 mm, F; UCONN 24333, 98.62 mm, F; UCONN 24334, 97.48 mm, F; UCONN 24335, 90.45 mm, F; UCONN 24336, 102.39 mm, F; UCONN 24337, 99.88 mm, F; UCONN 24391, 99.13 mm, F; UCONN 24393, 112.66 mm, M; UCONN 24394, 98.6 mm, F; UCONN 24395, 97.84 mm, F; UCONN 24396, 96.16 mm, F; UCONN 24415, 100.04 mm, F; UCONN 24416, 95.81 mm, F; UCONN 24417, 114.92 mm, U; UCONN 24418, 118.37 mm, M; UCONN 24419, 114.66 mm, M; UCONN 24420, 91.65 mm, F; UCONN 24421, 97.06 mm, F; UCONN 24422, 96.87 mm, F; UCONN 24426, 115.35 mm, M; UCONN 24427, 118.15 mm, M; UCONN 24429, 98.27 mm, F; UCONN 24431, 97.14 mm, F; UCONN 24432, 99.95, F; UCONN

24433, 116.61 mm, M; UCONN 24434, 113.54 mm, M; UCONN 24435, 117.24 mm, M; UCONN 24438, 99.78 mm, F; UCONN 24439, 99.18 mm, F; UCONN 24440, 97.56 mm, F; UCONN 24441, 117.05 mm, M; UCONN 24442 mm, 100.35 mm, F; UCONN 24443, 99.73 mm, F; UCONN 24444, 96.94 mm, F; UCONN 24445, 99.28 mm, F; UCONN 24446, 116.04 mm, M; UCONN 24447, 117.97 mm, M; UCONN 24448, 113.56 mm, M; UCONN 24449, 118.2 mm, M; UCONN 24450, 117.94 mm, M; UCONN 24451, 96.37 mm, F; UCONN 24452, 93.29 mm, F; UCONN 24453, 101.61 mm, F; UCONN 24454, 98.21 mm, F; UCONN 24455, 98.79 mm, F; UCONN 24456, 98.84 mm, F; UCONN 24457, 123.61 mm, M; UCONN 24458, 96.49 mm, F; UCONN 24459, 98.9 mm, F; UCONN 24460, 97.24 mm, F; UCONN 24461, 100.31 mm, F; UCONN 24462, 115.35 mm, M; UCONN 24463, 97.51 mm, F; UCONN 24464, 98.58 mm, F; UCONN 24465, 111.59 mm, M; UCONN 24466, 115.33 mm, M; UCONN 24467, 94.11 mm, F; UCONN 24468, 100.56 mm, F; UCONN 24469, 103.2 mm, F; UCONN 24470, 119.48 mm, M; UCONN 24471, 96.42 mm, F; UCONN 24472, 116.05 mm, M; UCONN 24473, 113.48 mm, M; UCONN 24474, 118.03 mm, M; UCONN 24475, 112.69 mm, M; UCONN 24476, 121.92 mm, M; UCONN 24477, 113.28 mm, M; UCONN 24478, 115.91 mm, M; UCONN 24479, 98.61 mm, F; UCONN 24480, 95.72 mm, F; UCONN 24481, 100.29 mm, F; UCONN 24482, 100.59 mm, F; UCONN 24483, 114.26 mm, M; UCONN 24484, 118.16 mm, M; UCONN 24485, 116.09 mm, U; UCONN 24487, 120.29 mm, M; UCONN 24488, 91.61 mm, F; UCONN 24489, 100.11 mm, F; UCONN 24490, 101.15 mm, F; UCONN 24491, 100.34 mm, F; UCONN 24492, 97.65 mm, F; UCONN 24493, 110.5 mm, M; UCONN 24494, 110.58 mm, M; UCONN 24495, 116.59 mm, M; UCONN 24496, 100.18 mm, F; UCONN 24497, 99.44 mm, F; UCONN 24828, 117.91 mm, M; UCONN 24829, 109.74 mm, M; UCONN 24831, 116.41 mm, M; UCONN 24832, 94.62 mm, F; UCONN 24834, 100.07 mm, U; UCONN 24835, 118.95 mm, M; UCONN 24836, 121.93 mm, M; UCONN 24837, 100.57 mm, F; UCONN 24838, 102.58 mm, F; UCONN 24839, 99.64 mm, F; UCONN 24851, 96.7 mm, F; UCONN 24852, 100.36 mm, F; UCONN 24853, 95.8 mm, F; UCONN 24854, 116.1 mm, M; UCONN 24855, 98.79 mm, F; UCONN 24856, 98.88 mm, F; UCONN 24857, 112.94 mm, M; UCONN 24864, 97.99 mm, F; University of Massachusetts-Amherst (UMA) 3389, 116.05 mm, M; UMA 4082, 121.9 mm, M; UMA 4083, 121.56 mm, M; UMA 4167, 100.29 mm, F; UMA 5079, 115.24 mm, M; UMA 5148, 98.95 mm, F; UMA 5254, 120.04 mm, U; UMA 5355, 118.34 mm, M; UMA 5369, 96.54 mm, F; UMA 5370, 100.73 mm, F; UMA 5372, 99.78 mm, F; UMA 5374, 94.89 mm, F; UMA 5375, 98.34 mm, F; UMA 5376, 100.53 mm, F; UMA 5378, 98.27 mm, U; UMA 5386, 94.94 mm, F; UMA 5387, 96.57 mm, F; UMA 5389, 102.27 mm, F; UMA 5391, 95.64 mm, F; UMA 5399, 96.04 mm, F; UMA 5400, 96.68 mm, F; UMA 5401, 97.72 mm, F; UMA 5403, 98.45 mm, F; UMA 5404, 95.89 mm, F; UMA 5405, 99.06 mm, F; UMA 5406, 97.37 mm, U; UMA 5411, 97.81 mm, F; UMA 5421, 117.22 mm, M; UMA 5422, 97.77 mm, F; UMA 5426, 97.45 mm, U; UMA 5427, 100 mm, F; UMA 5429, 94.43 mm, U; UMA 5433, 100.24 mm, F; UMA 5444, 99.61 mm, F; UMA 5447, 112.92 mm, M; UMA 5449, 99.09 mm, F; UMA 5454, 96.81 mm, F; UMA 5457, 98.16 mm, F; UMA 5460, 117.07 mm, M; UMA 5462, 100.46 mm, F; UMA 5464, 99.03 mm, F; UMA 5465, 100.67 mm, F; UMA 5637, 97.24 mm, U; UMA 5638, 100.4 mm, F; UMA 5639, 99.79 mm, F; UMA 5640, 100.26 mm, F; UMA 5641, 95.82 mm, F; UMA 5648, 96.08 mm, F; UMA 5649, 93.99 mm, F; UMA 5651, 96.44 mm, F; UMA 5655, 97.59 mm, F; UMA 5657, 96.99 mm, F; UMA 5658, 97.43 mm, F; UMA 5662, 96.09 mm, F; UMA 5664, 100.17 mm, F; UMA 5665, 102 mm, F; UMA 5778, 96.06 mm, F.

*Martes pennanti pennanti*.- Museum of Comparative Zoology (MCZ) 39045, 96.53 mm, F; MCZ 39046, 98.23 mm, F; MCZ 44684, 112.09 mm, M; MCZ 44702, 113.55mm, M; MCZ 50621, 99.34 mm, F; MCZ 50622, 96.76 mm, F; MCZ 50623, 97.75 mm, F; MCZ 50624, 95.96 mm, F; MCZ 50625, 96.34 mm, F; MCZ 50626, 101.22 mm, F; MCZ 50627, 99.26 mm, F; MCZ 50628, 110.51 mm, M; MCZ 50629, 115.63 mm, M; MCZ 50630, 114.45 mm, M; MCZ 50632, 113.8 mm, M; MCZ 53992, 112.94 mm, M; MCZ 58256, 115.75 mm, M; MCZ 58257, 96.95 mm, F; MCZ 58258, 98.85 mm, F; MCZ 58260, 99.08 mm, F; MCZ 58261, 99.8 mm, F; MCZ 58262, 96.71 mm, F; MCZ 58264, 98.73 mm, F; MCZ 58265, 121.82 mm, M; MCZ 59139, 115.95 mm, M; MCZ 59141, 98.33 mm, F; MCZ 59142, 117.94 mm, M; MCZ 59143, 113.4 mm, M; MCZ 59144, 119.39 mm, M; MCZ 59145, 115.19 mm, M; MCZ 59148, 102.84 mm, F; MCZ 59149, 96.72 mm, F; MCZ 59150, 95.77 mm, F; MCZ 59151, 100.41 mm, F; MCZ 59152, 114.85 mm, M; MCZ 59153, 100.81 mm, F; MCZ 59154, 98.77 mm, F; MCZ 59155, 101.98 mm, F; MCZ 59156, 98.85 mm, F; MCZ 59158, 96.03 mm, F; MCZ 59703, 108.64 mm, M; MCZ 60077, 98.67 mm, F; MCZ 60626, 97.71 mm, F; MCZ 61570, 99.21 mm, F; MCZ 62033, 115.85 mm, M; MCZ 62172, 119.26 mm, M; MCZ 62223, 115.54 mm, M; MCZ 62391, 97.69 mm, F; MCZ 62613, 112.7 mm, M; MCZ 62614, 115.21 mm, M; MCZ 62615, 121.49 mm, M; MCZ 63661, 118.62 mm, M; MCZ 64165, 114.65 mm, M; MCZ 64686, 96.35 mm, F; MCZ 64688, 115.77 mm, M; MCZ 64689, 120.04 mm, M; MCZ 64691, 116.42 mm, M; MCZ 64692, 94.3 mm, F; MCZ 64694, 114.4 mm, F; MCZ 64697, 99.22 mm, F; MCZ 64713, 116.86 mm, M; MCZ 64714, 97.25 mm, F; MCZ 67103, 95.51 mm, F; MCZ 67105, 118.85 mm, M; MCZ 8434, 119.23 mm, M; University of Michigan Museum of Zoology (UMMZ) 172740, 116.23 mm, M; UMMZ 172795, 117.31 mm, M; UMMZ 172845, 117.57 mm, M; UMMZ 172961, 120.57 mm, M; UMMZ 172969, 112.82 mm, M; UMMZ 172981, 121.16 mm, M; UMMZ 172983, 100.21 mm, F; UMMZ 173137, 98.06 mm, F; UMMZ 173138, 104.5 mm, F; UMMZ 173158, 98.89 mm, F; UMMZ 173161, 119.63 mm, M; UMMZ 173162, 119.45 mm, M; UMMZ 173163, 117.78 mm, M; UMMZ 173167, 118.92 mm, M; UMMZ 173174, 117.93 mm, M; UMMZ 173184, 117.96 mm, M; UMMZ 173227, 97.88 mm, F.