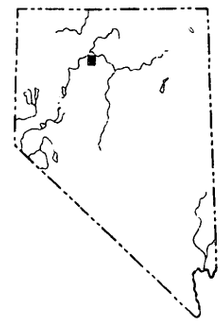
MAP GQ-656

DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

GEOLOGIC QUADRANGLE MAPS OF THE UNITED STATES

GEOLOGIC MAP OF THE WINNEMUCCA QUADRANGLE PERSHING AND HUMBOLDT COUNTIES NEVADA

By
James Gilluly



QUADRANGLE LOCATION

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GEOLOGY OF THE WINNEMUCCA QUADRANGLE PERSHING AND HUMBOLDT COUNTIES, NEVADA

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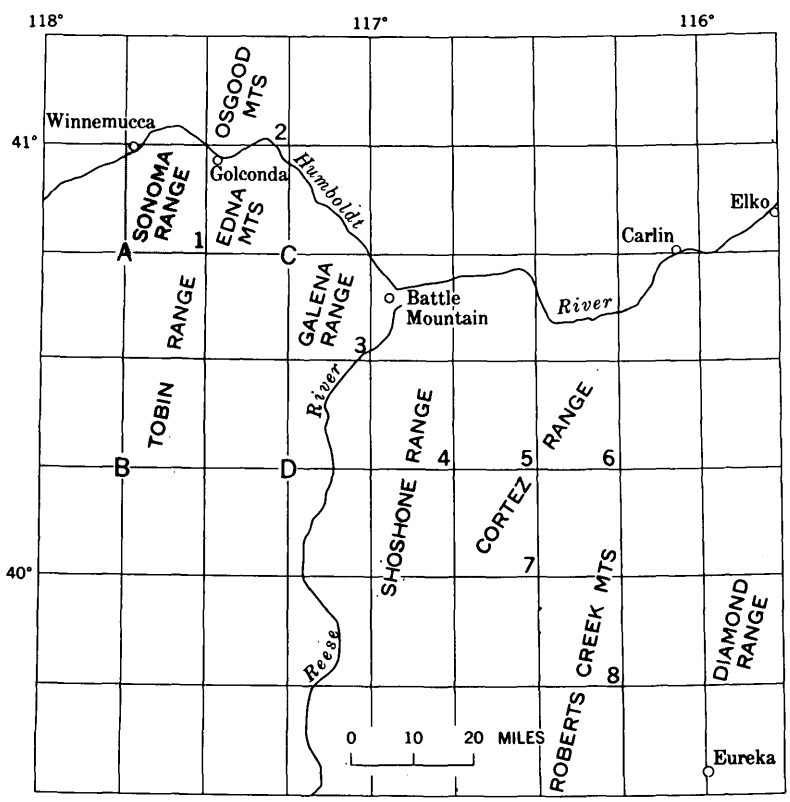
Introduction

The reconnaissance surveys at a scale of 1:125,000 of the Winnemucca (1) and adjacent quadrangles (2, 3, 9) (areas A, B, C, and D, fig. 1) demonstrated that the region is one of great structural complexity. The time available for these reconnaissance studies was insufficient to resolve many of the problems and the authors of the reconnaissance work frankly admitted that some parts of the published maps are geometrically inconsistent. With increased information from the general region (4, 5, 6, 8, 10, 11) it became increasingly desirable to try to resolve some of these inconsistencies. Thus, when a new topographic map on the larger scale of 1:62,500 became available (1958), remapping of the northern Sonoma Range was planned. With the able assistance of G. C. Cone, I began this mapping in 1961 and completed it in 1965. In the meantime, Silberling and Roberts (12), after additional reconnaissance, offered a reinterpretation of the structure which differed in several respects from that put forth in the earlier map (1). The present map differs from both its predecessors only in minor details, but the tectonic interpretations shown on the sections differ much more significantly.

Stratigraphy

Space limitations prohibit expansion of the stratigraphic descriptions beyond the summaries given in the map explanation. Full descriptions of the Osgood Mountain Quartzite, Preble Formation, and Harmony Formation are given by Hotz and Willden (6), of the Valmy Formation by Hotz and Willden (6), Roberts (11), and Gilluly and Gates (4). Although the conformable relation between the Osgood Mountain and the Preble is well established, the Harmony has not been found in succession with them. In the Osgood Mountain quadrangle (area 2, fig. 1) it overlies the Paradise Valley Chert, whose relation to the Preble is also



A. Winnemucca	Reference	1
B. Mt Tobin	do	9
C. Golconda	do	3
D. Mt Moses	do	2
1. Winnemucca	This report	
2. Osgood Mts.	Reference	6
3. Antler Peak	do	11
4. N. Shoshone Range	do	4
5. N. Shoshone Range	do	4
6. Frenchie Creek	do	8
7. Cortez	do	5
8. Roberts Mts.	do	7

FIGURE 1. MAP SHOWING LOCATION OF WINNEMUCCA QUADRANGLE WITH RESPECT TO NEARBY AREAS FOR WHICH REPORTS BY THE U. S. GEOLOGICAL SURVEY, AND OTHERS, HAVE BEEN PUBLISHED.

unknown (6). The Paradise Valley Chert does not crop out in the Winnemucca quadrangle; the Harmony is here separated from the Osgood Mountain Quartzite and the Preble Formation by a post-Miocene normal fault, downthrown on the west. This fault was interpreted as a thrust in both preceding papers and was given the name of Adelaide thrust. I know of no evidence that the Harmony in the lower plate of the Sonoma thrust has been moved far from its site of deposition, and I therefore consider the Adelaide fault a minor structure belonging to the basin-range suite of normal faults. There is nothing to suggest that it proxies for a major thrust.

The marked lithologic contrasts between the partly contemporaneous Valmy and Comus Formations in both Edna and Osgood Mountains give good grounds for thinking one of these formations has been brought into the region as a far-traveled thrust sheet (6, 10, 12). The Comus Formation is absent here, so the Winnemucca quadrangle furnishes no evidence as to which of the two has been so transported. But since the Valmy is rootless for many miles to the east, where the Comus is unknown, the suggestion (10) that the Valmy has been brought on a thrust from the west in pre-Mississippian time is here accepted, though it cannot be said to be proved. In the Winnemucca quadrangle the Valmy overlies the Harmony on the Sonoma thrust, which clearly traveled from east to west in post-Triassic time, a reversal of the earlier tectonic transport postulated.

The name Sonoma Range Formation of the earlier maps is here abandoned and rocks formerly assigned to it are considered part of the Valmy Formation. So, too, are the rocks of the small outcrop south of Thomas Canyon near its mouth [shown on (1) as Leach Formation and on (12) as Sonoma Range Formation], and the outcrops on either side of Water Canyon at the range front [shown on (1) as Havallah Formation and on (11) as Sonoma Range Formation]. None of these rocks seem to me to be distinguishable from those of the Valmy elsewhere. The limestone and associated sandstone east of Clear Creek just above its main forks was shown on both earlier maps as Edna Mountain Formation. I consider these strata part of the Harmony because of the interbedded two-mica arkose and shale, which are characteristic of the Harmony in the type locality, Harmony Canyon.

The Tallman Fanglomerate, Koipato Formation, and the overlying Triassic rocks of the "Winnemucca sequence" of Silberling and Roberts (12) have been well described in (1), (12), and (13). In the earlier studies the basal contact of the Tallman Fanglomerate was mapped as an unconformity; I consider it a thrust fault because of Koipato breccia fragments strewn out along it. As in (1), I have interpreted the contact between Koipato and the overlying Natchez Pass Formation to the south as a thrust, because of a large horse of Tallman Fanglomerate along it. Silberling and Roberts (12, fig. 6) thought it depositional. I also consider the northwest-trending contact in Dry Canyon between the Natchez Pass Formation and the overlying Grass Valley a fault; both earlier maps show this as depositional. As in (12), I have mapped the contact between these formations extending south from Dry Canyon as depositional; it appears in (1) as a fault. None of these differences of opinion seriously affects the interpretation of the stratigraphy.

The stratigraphy of the Tertiary rocks is simple and straightforward. An irregular topography had been carved across the highly disturbed Triassic and older rocks and some of the irregularities had been filled by gravel and other fluvial deposits, including moderate admixtures of tuff, when the Miocene welded tuffs were deposited.

Structure

Although regional relations suggest that the Valmy Formation was originally deposited somewhat farther west and was carried eastward on a thrust during the pre-Mississippian Antler orogeny, this is not quite certain. The fault on which it probably rode, while perhaps contemporaneous with the Roberts thrust, is structurally much higher, within the upper plate of that thrust. In the type locality (7) in the Roberts Mountains (fig. 1) and for 50 miles to the west, the Roberts thrust separates the eastern carbonate facies from the overlying eugeosynclinal facies of Cambrian through Devonian rocks. At its westernmost exposures, in the northern Shoshone Range (fig. 1), nearly 40 miles to the southeast of the Winnemucca quadrangle, the fault plunges beneath the Reese River Valley (4). The many thrusts within the eugeosynclinal facies farther west (6, 11) cannot be identified with the Roberts thrust but must be structurally higher. Throughout the extent of the identifiable Roberts thrust—that is, in the area east of the Reese River where the carbonates of the lower plate are exposed—the upper plate is itself cut by numerous thrusts of great displacement comparable to those of the Galena and Osgood Ranges (4, 5).

Whether or not the present Sonoma fault formed the sliding surface on which the Valmy Formation traveled eastward during the Antler orogeny, it assuredly was active during post-Triassic deformation in bringing the Valmy westward. I interpret it as the lowest of four major thrusts in the area. It can be readily followed from a point northeast of Sonoma Peak where it appears from beneath the older Tertiary gravels in an overturned attitude, northwestward, northward, westward and southward around a south-plunging synform, everywhere separating Valmy in the upper plate from Harmony in the lower.

It is in the interpretation of the trace of this fault in Thomas Canyon that the present map differs most significantly from the earlier ones. See also figure 2. In (1) the rocks resting in fault contact on the Harmony on the south wall of the canyon were mapped as Leach Formation; in (12) as Sonoma Range. As stated above, I cannot distinguish these rocks from the Valmy elsewhere and have therefore included them in the Valmy. I thus find a fault on the south wall of the canyon that separates Harmony below from Valmy above—just as it had for a dozen miles of strike to the north and east. Although several Tertiary dikes prevent walking out the faults to a junction, I can see no reason to think they are other than a single fault. I therefore interpret the fault called "Thomas fault" in the earlier work as merely the continuation of the Sonoma fault. This means that the block containing the Tallman Fanglomerate and higher strata including the Triassic rocks to the south lies above the Sonoma fault, not beneath it as the earlier studies concluded.

Both the earlier maps show an intersection of the "Thomas thrust" with a higher thrust about 2 miles from the mountain front, on the south wall of Thomas

Canyon. I found no such intersection; if one exists here, it has rocks I consider Valmy on both walls, for I was able to walk northwestward on such rocks continuously to a pinchout close to the mountain front. Here, indeed, a higher thrust—herein called the Tallman thrust—which was not recognized in the earlier work, intersects the fault I consider to be the Sonoma, bringing Tallman Fanglomerate on its upper plate to rest on Harmony Formation of the lower plate of the Sonoma thrust. A large horse of Koipato volcanics marks the Tallman fault. Both Sonoma and Tallman faults dip southerly, like the plunging synform to the east, and neither appears anywhere to the south within the map area. All the structure sections, therefore, show the Sonoma thrust as the lowest in the quadrangle. In the northernmost section the Tallman thrust lies next above the Sonoma, but farther south one major and several minor thrusts intervene between them.

Both earlier maps indicate the fault bounding the east side of the window of Triassic rocks at the forks of Sonoma Creek as the Sonoma fault. Inasmuch as the Sonoma fault in Thomas Canyon carries the Permian and Triassic rocks in its hanging wall above the Tallman fault, whereas in the Sonoma Creek locality the fault brings Valmy to rest on the Triassic of the window, the two cannot be a single fault. On the diagram (fig. 2) and sections herewith, the fault bounding the window on the east is labeled the "Forks thrust."

The highest major thrust in the area is the Clear Creek thrust, which carries Harmony Formation of its upper plate onto Valmy of the upper plate of the Forks thrust and onto Permian and Triassic formations. Silberling and Roberts (12, fig. 6) did not consider the fault bounding the western window of Triassic rocks on the east a part of the Clear Creek fault, as it has been in the earlier map (1). They named this segment the "Mullen Canyon thrust." Inasmuch as this fault has been walked to a junction with the Clear Creek fault as recognized by all, I have returned to the earlier usage and regard the Mullen Canyon thrust of (12) as part of the Clear Creek thrust.

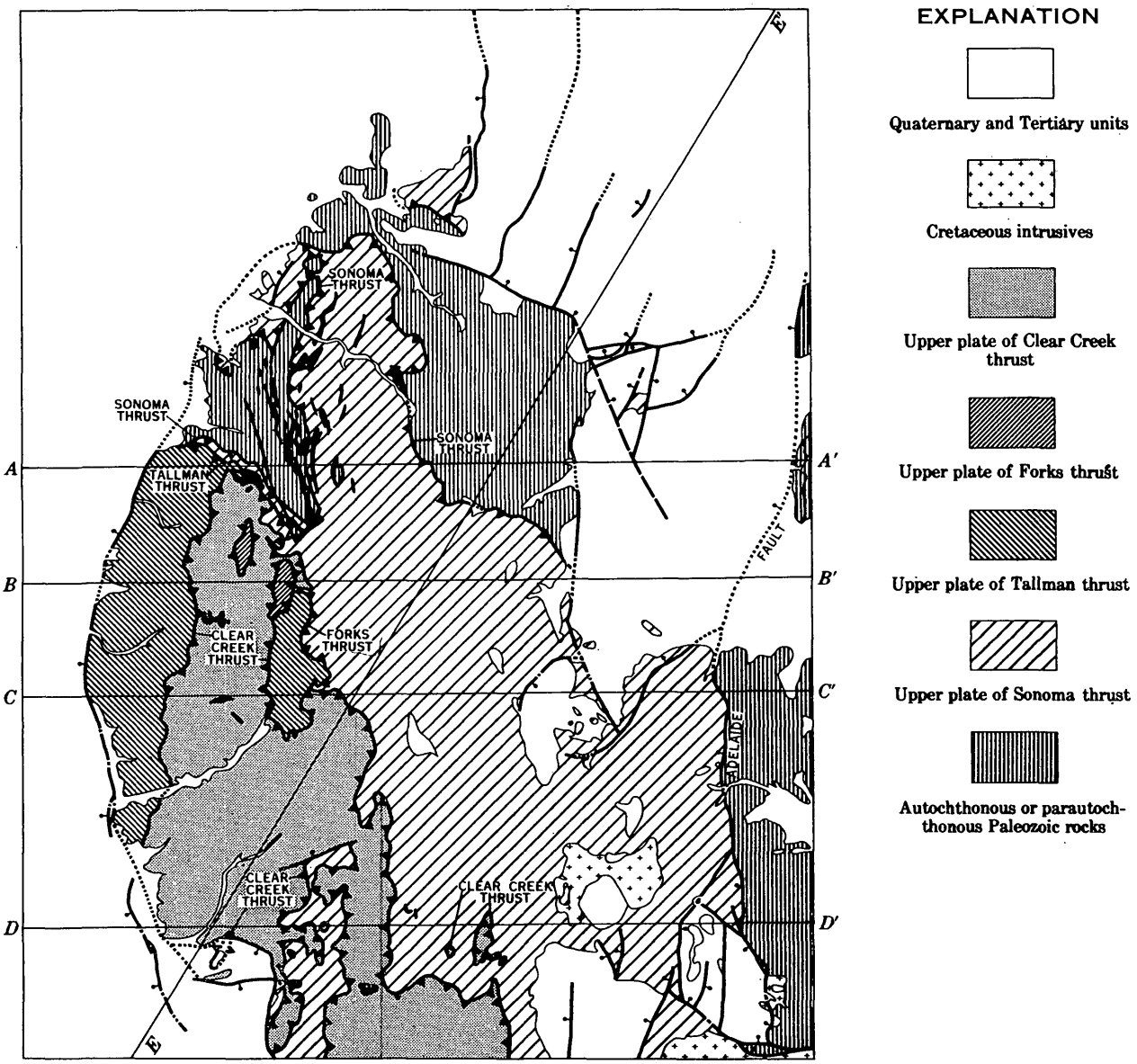


FIGURE 2. DIAGRAM SHOWING MAJOR TECTONIC UNITS AND FAULT NOMENCLATURE

All the thrusts are obviously post-Triassic and all are thrown into asymmetric folds that indicate overriding from east to west. No local evidence indicates any west-to-east transport such as very probably took place in the region during the Antler orogeny of Mississippian age. The area preserves no record of the Sonoma orogeny of Permian age either. If the intrusion of the Cretaceous pluton is related to the deformation here recorded, this may have been the time of the east-to-west transport, for Cretaceous thrusting in the same sense has been recognized in the Jackson Mountains to the northwest (13). The folding of the thrusts—in several places to the extent of overturning—was partly concurrent with the thrusting and, since all the faults seem to be folded on common axes, was probably completed at a late stage of the deformation.

All the thrusts plunge southward and, as mapped in (1), are overridden a short distance south of the map area by the Tobin thrust. The Tobin thrust therefore must also be of post-Triassic age and also most likely of east-to-west carriage. Such an interpretation is contrary to that accepted in earlier work and of course cannot be considered established in absence of large-scale mapping of the areas wherein the Tobin thrust is itself exposed. Be this as it may, the local evidence seems conclusive that the "Winnemucca sequence" of Silberling and Roberts (12) was deposited at a site at least several miles to the east of the present Sonoma Range, whence it was brought during post-Triassic, perhaps Cretaceous, time on the Sonoma thrust. This raises very puzzling problems of paleogeography which cannot be solved until much more large-scale mapping has been done in adjacent areas. The inadequacy of our information is underlined by the fact that none of the eugeosynclinal formations of Silurian and Devonian age which are so widespread in the upper plate of the Roberts thrust to the east (4, 5) has yet been identified anywhere to the west of the Reese River Valley, whence they must surely have been derived during the Antler orogeny.

Tertiary deformation

The normal faulting to which the present relief of the range is due seems to be younger than the welded tuffs whose radiometric age of about 15 million years falls in middle or late Miocene. Faulting has continued into late Pleistocene—perhaps Recent—time, as judged from the freshness of some of the scarps. The fresh scarps of the 1915 Pleasant Valley earthquake to the south do not extend into this quadrangle.

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