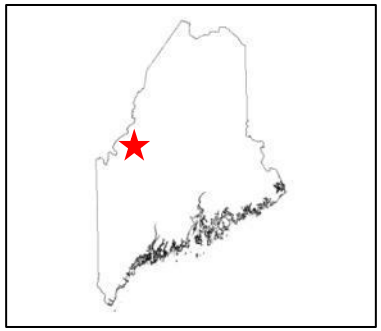
Maine Geologic Facts and Localities

October, 2007

The Geology of the Moose River "Bow Trip“ Northwestern Maine



45° 32‘ 40.03“ N, 70° 22‘ 27.93“ W

Text by
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Introduction

The Moose River lies in the Kennebec River watershed and flows east from its beginnings in the mountains along the Maine and Canadian border (Figure 1). The river flows into Long and Brassua Lakes and eventually to Moosehead Lake and the headwaters of the Kennebec River. The Moose River trip is not one of Maine's big whitewater canoe trips, but it does offer peaceful paddling through a beautiful region. The ability to start and finish at the same spot and not shuttle vehicles, as well as the remote beauty of the area, make this a very popular trip during the summer season.

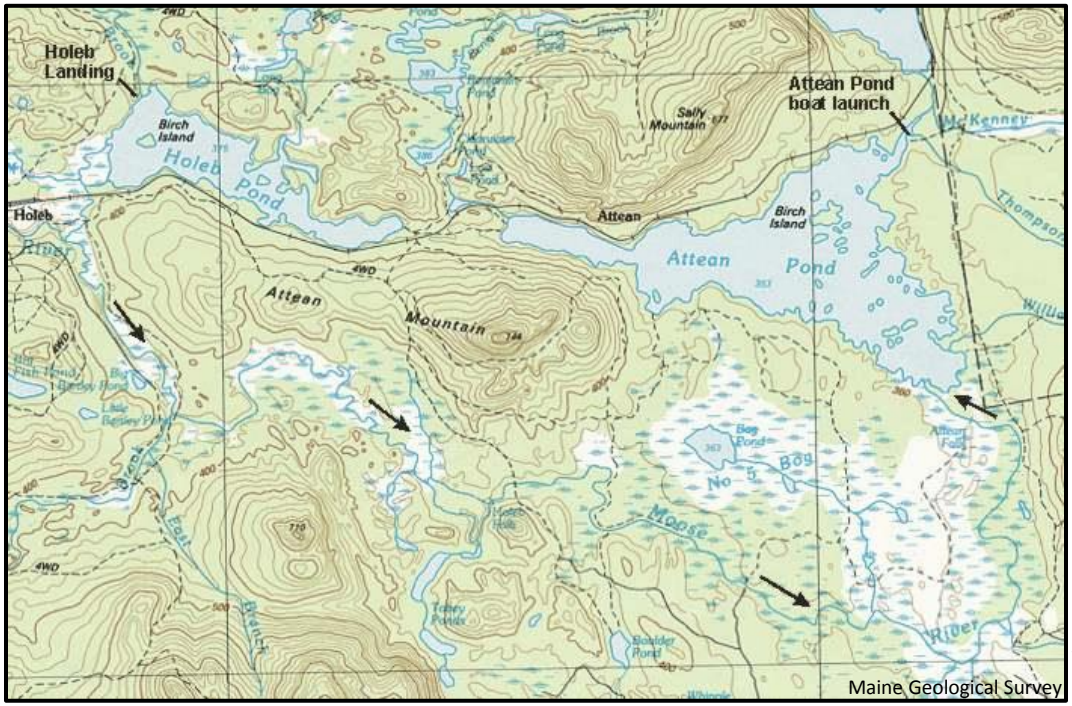

Figure 1. A portion the Megantic 1:100,000-scale topographic map (U.S. Geological Survey) showing the Moose River "Bow Trip."

Introduction

A twenty-four mile section of the Moose River is a portion of the "Bow Trip," a popular three-season canoe trip (Figure 2). The Bow Trip travels through remote forests and bogs and across isolated Attean and Holeb Ponds. The entire trip is 34 miles long and is usually done in three days. The canoe trip can begin at the east end of Attean Pond off Maine Route 201 or at Holeb Landing, by way of Holeb Road. There are three or four recommended portages, including a one and a quarter mile portage between Attean and Holeb Ponds.

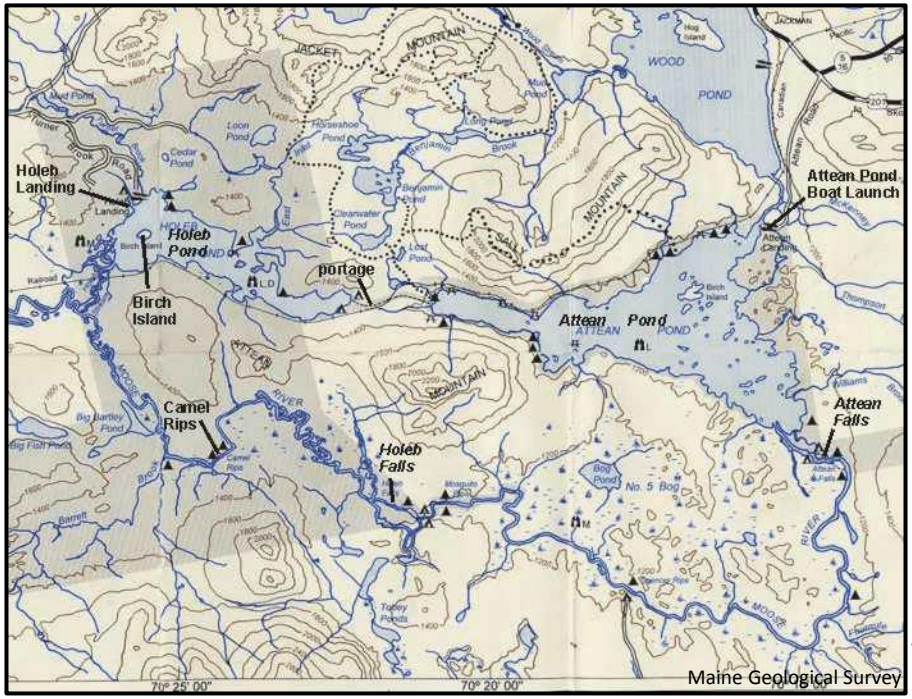

Figure 2. A portion of the Maine Department of Conservation, Bureau of Parks and Lands map of the Holeb Public Lot. Map shows "Bow Trip" with the Moose River and Attean and Holeb Ponds. Features described in the text are labeled.

Geologic History

The geology of the Moose River is dominated by two factors, the underlying resistant bedrock (Attean Quartz Monzonite) and the lingering effects of continental glaciation. The "Bow Trip" section of the Moose River is mostly flat water with occasional whitewater areas where bedrock outcrops occur. Continental glaciation of late-Wisconsinan age scoured out lake basins and river valleys, and smoothed bedrock outcrops. Glacial ice filled valley lowlands, dammed meltwaters, and created large proglacial lakes. Thick layers of silt and clay were deposited in these lakes and are now being reworked by the modern river.

Regional Geology

The Moose River is underlain by Ordovician-age igneous and metamorphic rocks. The Attean Quartz Monzonite is the most common rock type along the river and ponds with diorite, a plutonic rock, the second most common rock type. Outcroppings of granofels, a metamorphic rock, are also encountered (Figure 3).

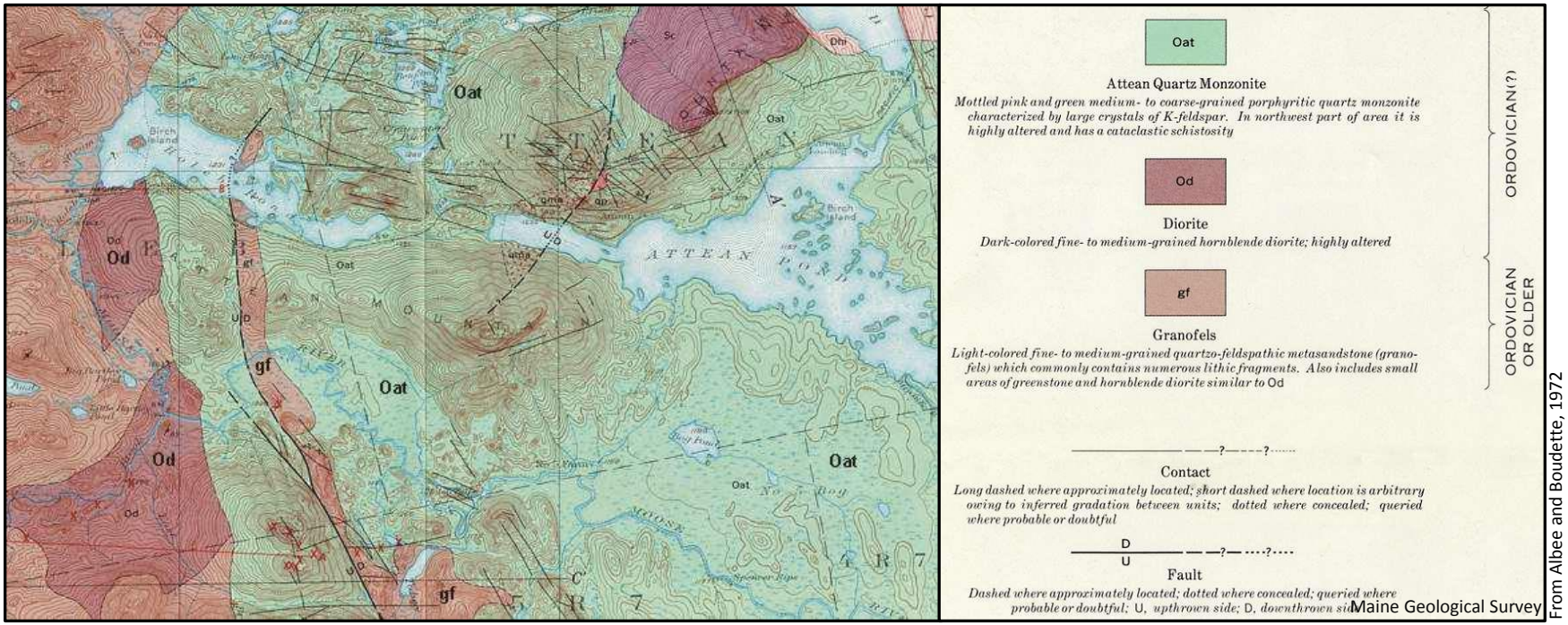

Figure 3. A portion of the bedrock geologic map of the Attean 15' quadrangle including the Moose River and Attean and Holeb Ponds. The Attean Quartz Monzonite is shown as Oat, Od is diorite, and gf is granofels.

Regional Geology

The region lies on the crest of a major structural feature, the Boundary Mountain anticlinorium (Albee and Boudette, 1972) which extends from northern New Hampshire into northwestern Maine. This feature is composed of many smaller folds, which themselves are on the order of several miles across. The region is well covered by glacial materials, most commonly till (also called diamicton), an unsorted and unstratified sediment which was deposited directly in contact with glacial ice (Figure 4).

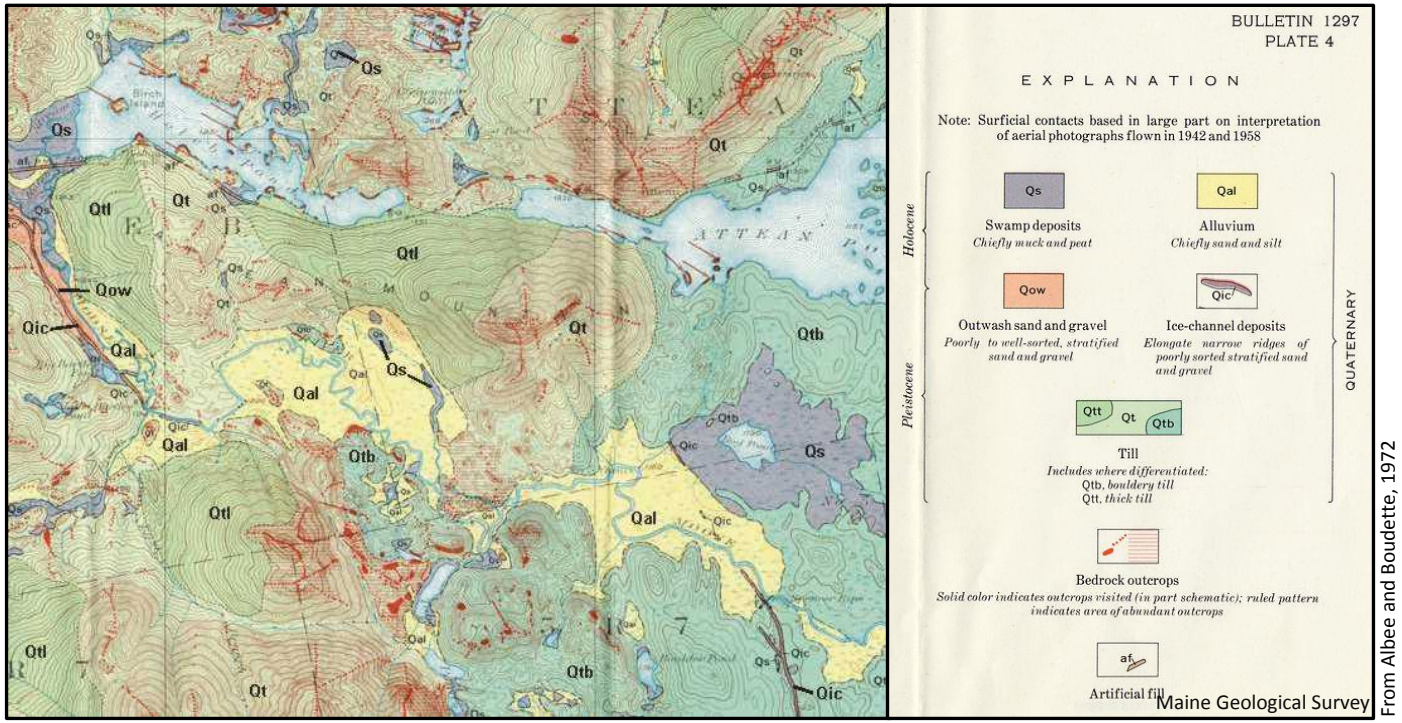

Figure 4. A portion of the surficial geologic map of the Attean 15' quadrangle showing swamp deposits (Qs), alluvium (Qal), outwash sand and gravel (Qow), ice-channel deposits (Qic), and till deposits (Qt).

Moose River Geology

We begin the canoe trip at Holeb Landing, on the northwest shore of Holeb Pond where there is a popular Maine Forest Service campsite. Outcrops here and on Birch Island, a half-mile offshore from the Landing, are granofels and diorite. Granofels is a medium- to coarse-grained metamorphic rock which has little or no foliation or lineation. Diorite exposed here is a dark-colored, fine- to medium-grained hornblende diorite (Figure 5).

Photo by Robert A. Johnston

Figure 5. Diorite exposed on the north shore of Birch Island, Holeb Pond.

Moose River Geology

Along the shoreline of Holeb Pond are deposits of broken rocks, consisting of granofels, diorite, and Attean Quartz Monzonite which have been broken up by wave, ice and frost action. Holeb Stream, which leads to the Moose River, is about a one mile paddle to the southwest from Holeb Landing. At times of high water, Holeb Stream flows into Holeb Pond. Flooding in the Moose River causes water and sediment to reverse flow and over time the lake-outlet delta found at the west end of Holeb Pond formed (see Caldwell and others, 1989). Shortly after entering Holeb Stream, one paddles under the Canadian-Pacific rail line. Fill brought in here to support the tracks is most likely slate from the Brownville Junction area, almost one hundred miles to the east by rail.

Moose River Geology

A mile down Holeb Stream is the confluence of the Moose River (Figure 6). From here the Moose River meanders southeast for about two miles along the eastern edge of a large esker, a long, narrow ridge of stratified sand and gravel which was deposited in a subglacial tunnel. Geophysical surveys show this esker to contain a thickness of over fifty feet of sand and gravel. Coarse boulder gravels often are exposed along the riverbank, in sharp contrast to the more commonly seen fine sand, silt, and clay.

Figure 6. Sandbar at the confluence of Holeb Stream and the Moose River.

Moose River Geology

Outcrops of Attean Quartz Monzonite (Figure 7) are encountered at Camel Rips (Figure 8), Holeb Falls, Mosquito Rips, Spencer Rips, and Attean Falls. With basic canoeing skills, four of these rapids can be run in medium to high water.

Figure 7. Attean Quartz Monzonite (25-30% quartz, 30-35% potassium feldspar, 35-40% plagioclase, and 5-10% mafic minerals [Albee and Boudette, 1972]). Sample shown is from east end of Holeb Pond.

Moose River Geology

Figure 8. Camel Rips section of the Moose River, which is an exposure of the Attean Quartz Monzonite. A popular campsite is located here.

Moose River Geology

However, Holeb Falls can never be run as it is a forty-foot drop down a steep chasm (Figure 9). The portage trail around Holeb Falls is along the north side of the river.

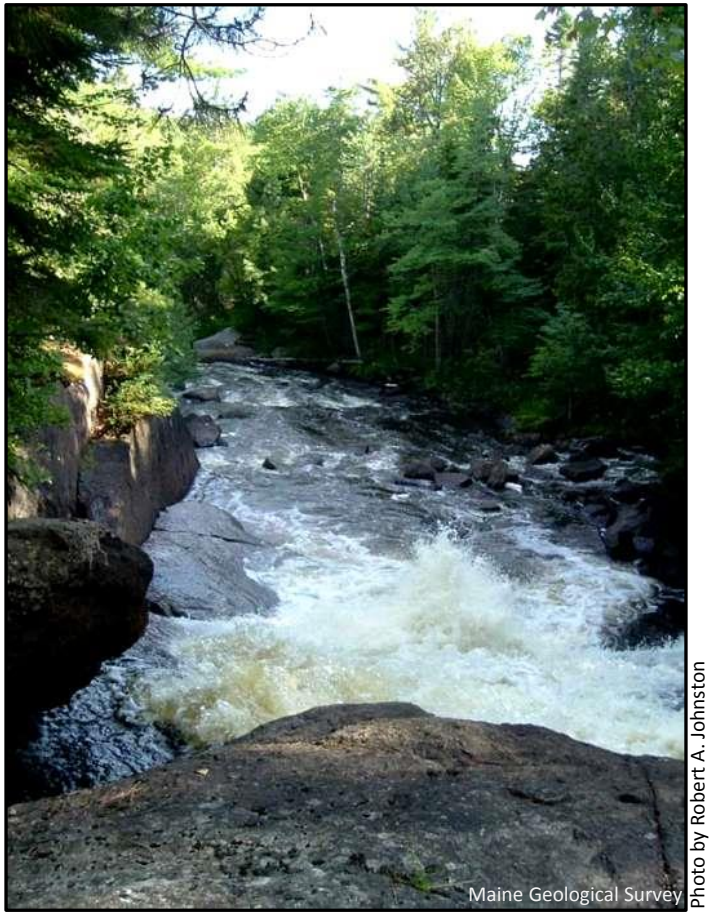

Figure 9. Holeb Falls, an outcrop of Attean Quartz Monzonite. The portage trail is along the north side of the river.

Moose River Geology

In areas where the river meanders, thick deposits of fine-grained silts and clays are found (Figure 10), evidence that in the distant past lakes existed along these stretches. Number 5 Bog, one of Maine's largest peat deposits at over 1,400 acres, lies just north of the Moose River, in T4 R7, T5 R7, and Attean Townships. Fifteen to twenty feet of peat has been identified in the bog, again providing evidence of an old lake filling the basin (Cameron and others, 1984). Number 5 Bog is nationally recognized for its rare plants and associated jack pine tree stand (Tyler and Davis, 1982). Smaller bogs are found along other stretches of the Moose River.

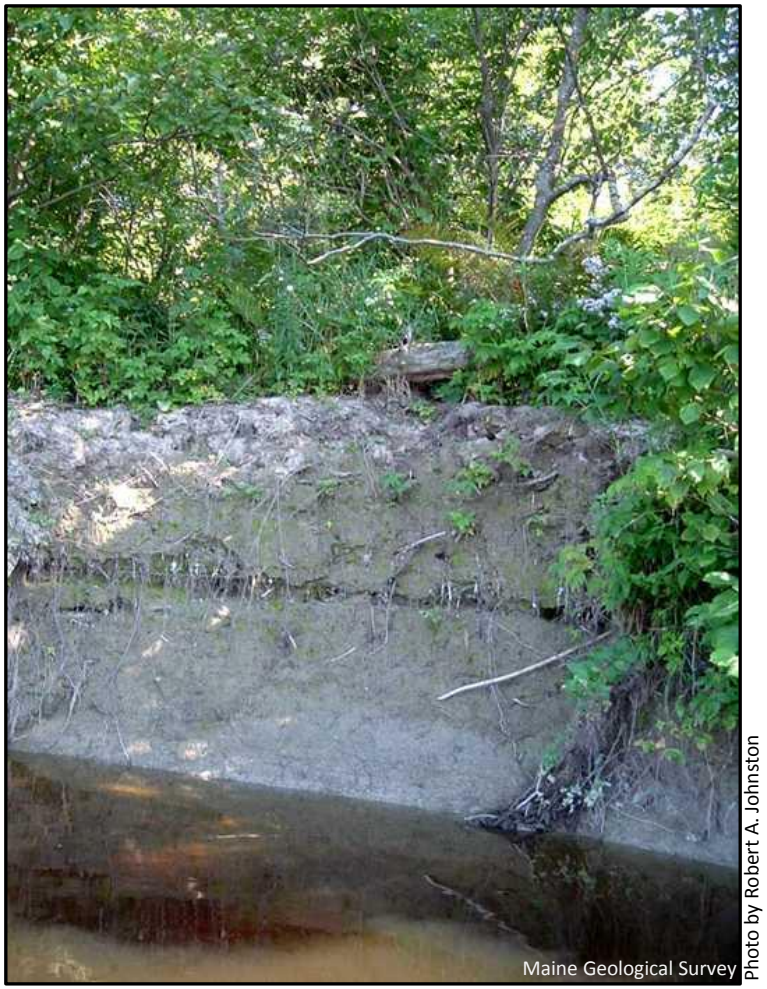

Figure 10. Five feet of silt over more than two feet of clay along a meander of the Moose River below Holeb Falls.

Attean and Holeb Ponds

Once past Attean Falls (Figure 11) paddling is across remote Attean Pond (and Holeb Pond if the trip was started there). Boulders and outcrops found in and along the shore of Attean and Holeb Ponds are Attean Quartz Monzonite.

Figure 11. Attean Falls, another outcropping of Attean Quartz Monzonite. These rapids can be run with higher water levels.

Attean and Holeb Ponds

Once out on Attean or Holeb Ponds, one can look up at Attean Mountain to see the effects of glaciation with its smooth northern side and a steeper, plucked southern side. Similar shaping of bedrock is seen on many of the small islands in Attean and Holeb Ponds, an indicator of the northwest to southeast flow of the ice (Figure 12).

Figure 12. Ice-smoothed bedrock (quartz monzonite) on Attean Pond.

Attean and Holeb Ponds

Beautiful sand beaches (Figure 13) are also found on the two ponds. The mile and a quarter portage between Attean and Holeb Ponds (Figure 14) is mostly on till and small wetland units, but outcrops of the monzonite are also encountered.

Figure 13. Sand beach in front of one of the campsites on Attean Pond.

Attean and Holeb Ponds

Figure 14. Boardwalk through a marshy area on the portage (1.25 miles) between Attean Pond and Holeb Pond.

Attean and Holeb Ponds

Till lies mostly on the upland areas while silt and clay cover the lowland areas. Once back on Holeb Pond, paddling towards our starting point at Holeb Landing, a lens of granofels is encountered (Figure 15), between outcrops of the Attean Quartz Monzonite.

Figure 15. Outcrop of granofels along the north shore of Holeb Pond.

References and Additional Information

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