

SHAPING THE TALLEST PEAK ON EARTH

MOUNT EVEREST, PART OF THE HIMALAYAN MOUNTAIN RANGE, was created 30 to 50 million years ago when the Eurasian continental plate collided with the Indian sub-continental plate. The collision caused the Earth's surface to wrinkle, similar to how pushing against the edge of a flat rug will cause it to buckle. Also key to the shape of Earth's tallest mountain is the glacier. Mount Everest's glaciers descend from the main peak and nearby peaks. Glaciers over millions of years have formed the mountain's pyramid-shaped horn. Below the horn, the glaciers continue to erode cirques, the bowl-shaped valleys below the horn. As glaciers move down the mountain, often at a speed of 3-4 feet per day, the weight of the packed snow and ice carves the mountain further, creating U-shaped valleys.

GUIDING QUESTION

What physical features do climbers encounter on their way to the summit of Mount Everest?

Students analyze the features of Mount Everest through maps, photographs, film clips, and a virtual globe, then envision encountering those features while climbing the mountain in 1924 and today.



Handout

- *The Shape of Mount Everest*

Film Clips

- *White Fang*
- *George Mallory's Route to Everest*

DIRECTIONS

1. Focus students on facts about visiting Mount Everest without naming it.

Read aloud or display a series of facts about visiting this extreme environment, without naming Everest. Give students the opportunity to discuss with a partner or small group what or where this place might be. Facts can include:

- 99 percent of visitors arrive here in May.
- It costs between \$25,000 and \$60,000 to travel here.
- More than 200 visitors have died trying to reach this place.
- No one, to our knowledge, came here before 1953.
- It is likely that you would lose 15 to 25 pounds visiting here.
- You are guaranteed a sunburn, and have a 50-percent chance of getting frostbite.
- When arriving, it is recommended that you leave right away, but some people linger for up to an hour.
- At this location, you are in two different countries at the same time.

Explain that students will explore in class and through film the highest mountain on Earth, Mount Everest, as well as aspects of George Mallory's 1924 climbing attempt and expeditions today.

2. View a film clip from "The Wildest Dream."

Show the film clip "White Fang" two or three times, having students first look at the appearance of the mountain with the sound turned off. Have them jot down their own descriptions of the mountain. Then view again, listening closely to the narration. Ask: *What terms does the narrator use to describe Mount Everest?* (wildest creation of a dream, rugged giant, prodigious white fang, colossal rock plastered with snow, an appalling sight). Discuss: *Why do you think people dare to climb Mount Everest?*



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VOCABULARY

- cirque
- col
- crevasse
- cwm
- face
- glacier
- horn
- icefall
- ridge
- U-shaped valley

**“My dearest Ruth,
we have found
our way to the
great mountain.”**

– George Mallory

3. Discuss forces that shape a mountain.

Access students’ prior knowledge of the plate tectonic forces that continue to push the Himalaya up from sea level, as well as the weathering and erosion that also impact the shape of a mountain range. Have students discuss in pairs or small groups descriptions of five to ten features they might encounter climbing a mountain such as Everest, e.g., glaciers. Show the film clip “George Mallory’s Route to Everest” and have students add to their lists of features.

4. Research mountain features and identify them on Mount Everest.

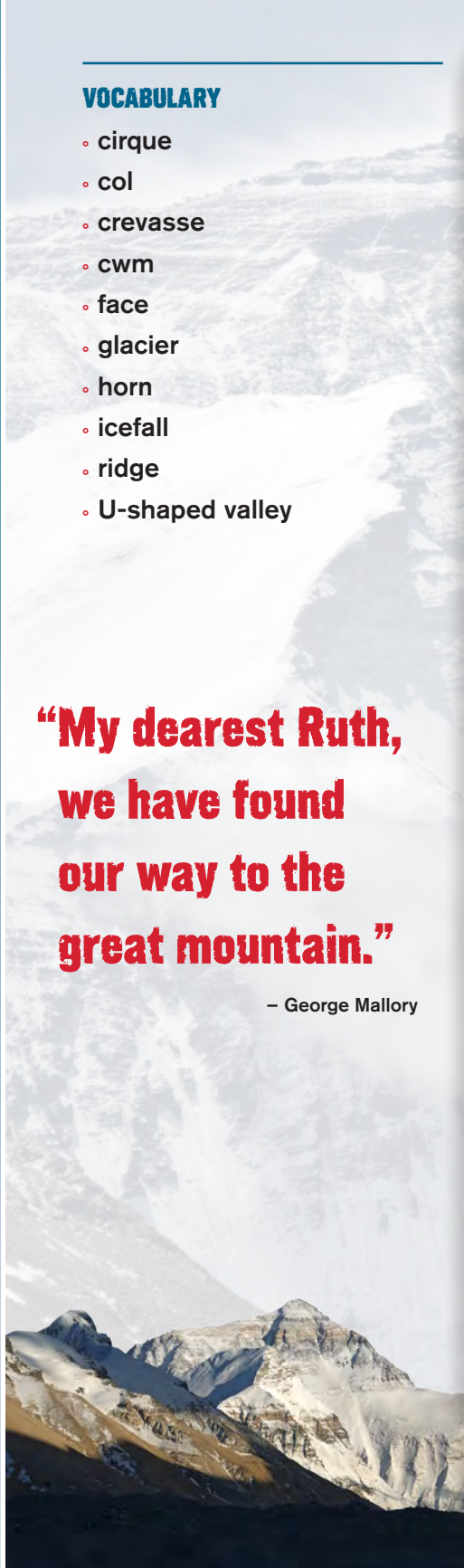
Provide [Handout 1: The Shape of Mount Everest](#) to students and have them research the terms for features climbers encounter on Everest. Note: You might have them begin with the definitions provided in the glossary. If possible project the maps for the whole class to observe together, and discuss the route Mallory took to the summit on the Northern Approach map. Students saw much of this mapped route in the film clip in Step 3. Have them also view photographs of features such as the [Khumbu Icefall](#) and other National Geographic photography in the [Climbing Mount Everest photo gallery](#).

5. Have students view Mount Everest using a virtual globe.

Google Earth™ has very detailed satellite imagery of Mount Everest, its features, and its surroundings. Have students take a closer look at the shape of the mountain using this high-resolution satellite imagery in 3-D. Use these tips to navigate to Mount Everest:

- Download and open Google Earth™ (Note: For best performance, use version 5 or later.) In the “Fly to” box, type Mount Everest and click enter or the search button.
- Under “Layers,” check “Terrain” to turn on 3-D imagery. With some versions you can select the terrain feature under “Preferences.”
- Use the tools on the right to move up and down, zoom in and out, and change the orientation of your vantage point (e.g., view Mount Everest from the northeast or southwest):
- Click and hold the arrow above the eye at top right to tilt the terrain to view the horizon in the distance behind Mount Everest.
- Zoom in and out using the plus and minus on the right, or click on the terrain with the hand tool, moving your mouse to move and explore the terrain.
- To view Mount Everest from all directions, click and drag the “N” at top right, and move it around the circle.

Using the high-resolution imagery and navigation tools, have students look for glaciers, horns, the Khumbu Icefall and other features on the handout.



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“For months, Mallory led the search. But the route to the summit eluded him. Finally, late in August, he found what he was looking for. An enormous glacial valley that snaked for miles around the other giant peaks towards the very foot of Everest.”

– The Wildest Dream



6. Analyze the map.

Using what they've learned from their research and the virtual globe, have students analyze the maps on the handout. Have them answer the following questions, discussing their answers as a group:

- *In which two countries would climbers be when at the summit of Everest?*
- *Look at the routes various expeditions have taken to the summit of Everest. Which features are most commonly traveled? (glaciers, faces, ridges, cwms)*
- *Describe what you think would be advantages and disadvantages of traveling along each of these features: glacier, face, ridge, cwm.*

Take a class poll for whether students would choose Mallory's route or another route if climbing Mount Everest. Note that students will further clarify the features of Everest explored in this lesson in subsequent activities and in viewing the film.

EXTENDING THE LESSON

Have students write two communications to others envisioning an experience on two days—85 years apart—climbing Mount Everest. Have students date one dispatch in 1924 and one in 2010, illustrating the differences they imagine in exploring Everest with minimal maps and no prior route-finding in the 1920s with that of today.

The polar regions, especially Antarctica and Greenland, contain 95% of the world's glaciers. They are called continental glaciers. Outside of the polar regions, the Himalaya have the greatest amount of glacial coverage. Have students research the importance of these glaciers to the people of South Asia. What river systems do they feed?

SUGGESTED RESOURCES

Climbing Mount Everest Photo Gallery

http://photography.nationalgeographic.com/photography/photos/climbing-mount-everest/#everest-morning-light_10479_600x450.jpg

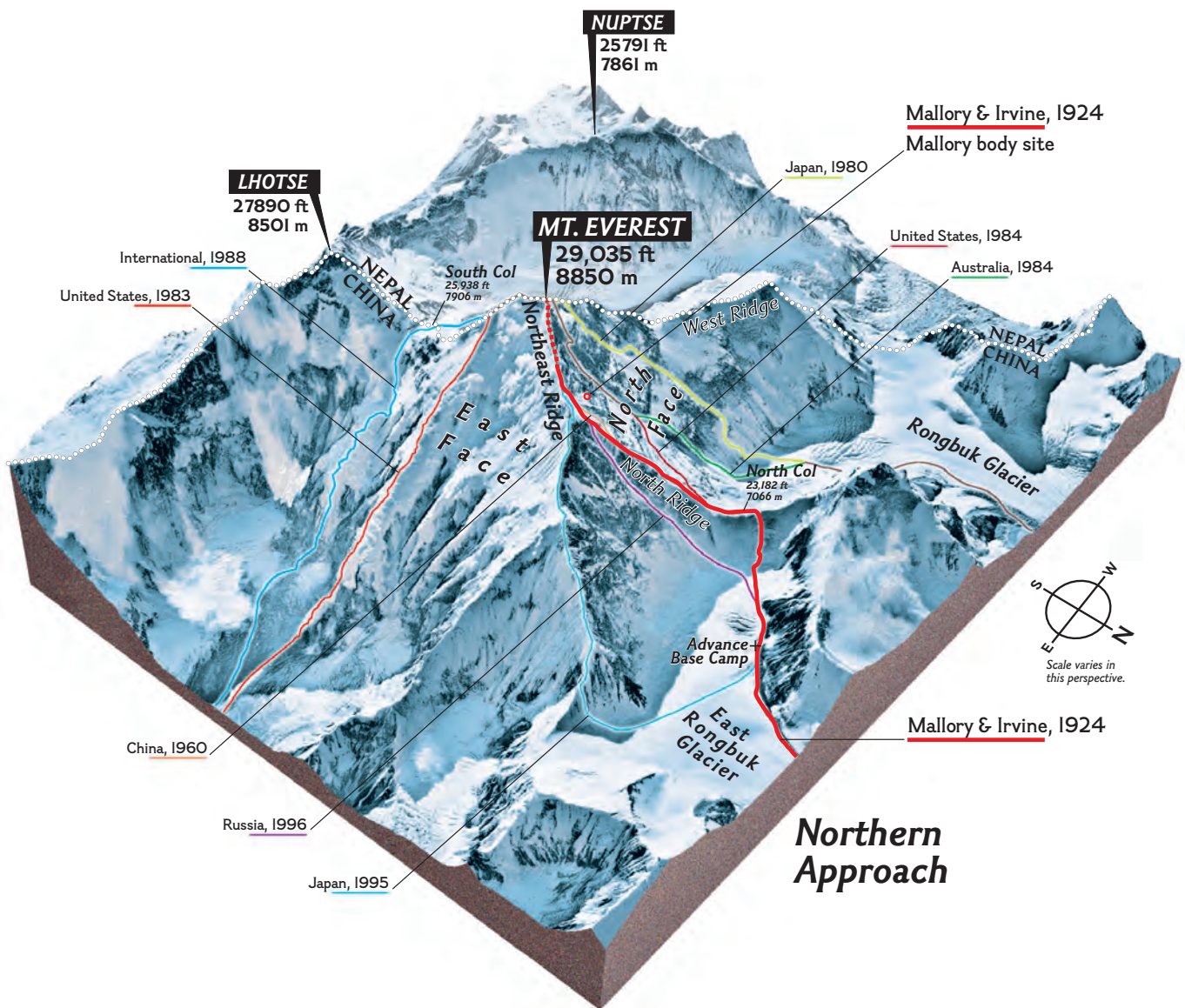
Image of the Khumbu Icefall: <http://photography.nationalgeographic.com/photography/photo-of-the-day/khumbu-traverse-nepal-pod/>

Coburn, Broughton, *Everest: Mountain Without Mercy*, National Geographic Books: 1997.

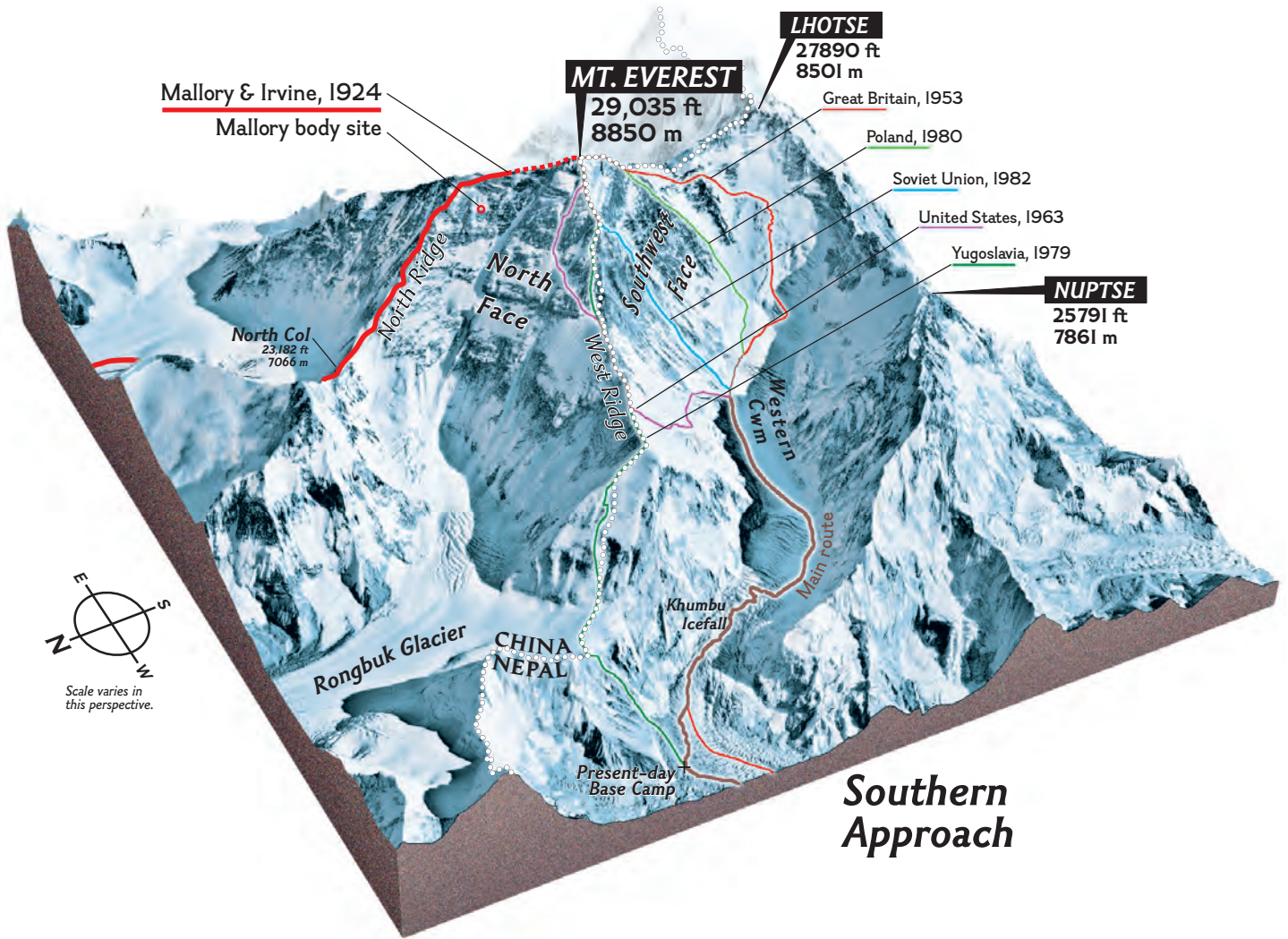
THE SHAPE OF MOUNT EVEREST

Research definitions or descriptions for the following mountain features. Then with colored pencils or highlighters, create a key and mark at least one of each feature on the maps of the north and south routes to Everest. Some are already labeled, and others you will need to use your research to predict where a climber would likely encounter them.

- cirque
- crevasse
- face
- horn
- ridge
- col
- cwm
- glacier
- icefall
- U-shaped valley



THE SHAPE OF MOUNT EVEREST



Southern Approach