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A METHOD FOR CLIMBING RAIN FOREST TREE BOLES WITHOUT USING VERTICAL ROPES

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ABSTRACT. Obtaining specimens from the forest canopy is a perennial problem for tropical biologists. A safe and easy method that does not require the use of a vertical rope is described suitable for ascending straight young branchless tree boles of 10–35 cm in diameter or large lianas. It uses rope loops attached to foot and waist assemblies, which pass twice about the tree trunk and are cinched off with small ascenders. The climber can ascend to heights of 15–25 m and reach botanical specimens with a saw attached to a long pole, or detach from the loops and move about the canopy using other climbing gear. While on the loops, the climber is firmly attached to the trunk and has both hands free to work.

INTRODUCTION

An increasing number of biologists, using a variety of tree-climbing methods, are taking to the tropical forest canopy to collect and observe life (Dial & Tobin 1994, Donahue & Wood 1995, Moffett & Lowman 1995, Mori 1984, Muul & Liat 1970, Nadkarni 1988, Perry 1978, Yumoto 1994). Nearly all of the methods used require pulling a rope over a branch support before the vertical ascent using Prusik knots or mechanical ascenders (Dial & Tobin 1994, Whitacre 1981, Yumoto 1994). Installing a vertical rope is desirable if one or more persons wish to make repeated observations or collections in one part of the canopy. It is not efficient, however, if the climber only wants to collect a few plant specimens from one position.

Native climbers usually climb straight tree trunks using improvised loops around the trunk and considerable muscle power (e.g. Ingram & Lowman 1995, Yumoto 1994). Donahue and Wood (1995) recently described a safer method of ascending boles using technical climbing gear. Their method involves the use of two "tree slings" which are girth-hitched around the bole. These are alternately detached from the tree and the climber's waist-sling and reattached farther up the trunk as the climber ascends. In the method described here the climber is also attached to loops passing around the tree bole, but both the loops and the method of ascent are different. It is safe and requires little strength. This method also involves no vertical ropes, and is ideally suited to ascending middle and lower story trees (including palms) with straight, smooth boles of 10–35 cm diameter at breast height (DBH). Such trees are abundant in moist or wet tropical lowland forests, and are difficult to climb by most other methods. This method was developed specifically for obtaining botanical specimens from the middle canopy layers in the Mo Singto biodiversity research plot in Khao Yai National Park, central Thailand. It may also be useful for installing a vertical climbing rope where the thick understory makes it too difficult to shoot a line over a limb in the main or upper canopy.

MATERIALS AND METHODS

General Method

The method employs two rope loops—one attached to the climber's foot loops and the other to the waist sit-harness—each of which passes twice around the tree trunk. When these loops are loaded with the right tension, they do not slip even on smooth trunks. Passing twice around the trunk, each loop crosses itself and binds tightly to the trunk. A micro-ascender is tied into one end of each loop to make it possible to adjust the tension on the loop as one ascends or descends. Ascending the tree is done by alternately loading each loop and moving the other up while slackened, inchworm style, much the way one does using a vertical rope method.

Equipment

The equipment comprises three 'assemblies': the foot, the waist and the chest. The parts of each are described below. The knots required are the water knot, bowline and figure eight on a bight (see Padgett & Smith 1987).

FOOT ASSEMBLY (FIGURE 1):

- 1-inch nylon tubular webbing, 3–4 m, tied into 3 loops with tape knots
- Ankle or chicken loops (Padgett & Smith 1987, Whitacre 1981), barely large enough to fit over ones stockinged feet
- Rope, static climbing, 9 or 11 mm, about 3.5 m
- Micro-ascender, such as the small CMI Ultracender (Colorado Mountain Industries Corp.,

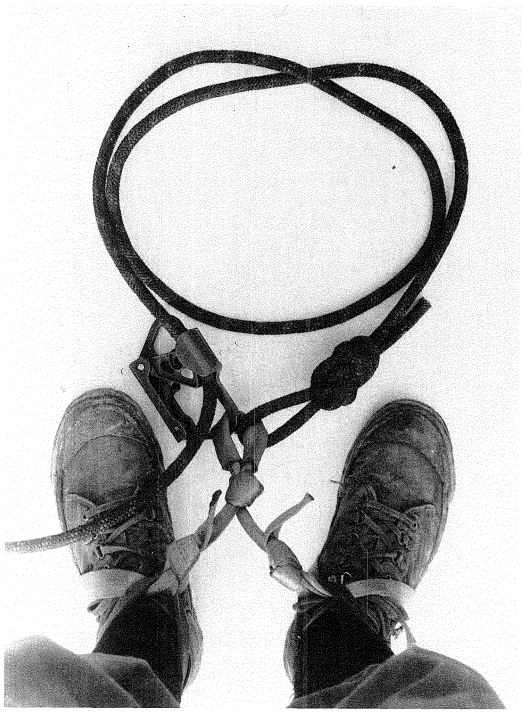

FIGURE 1. The foot assembly (see text).

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The 1-inch webbing is tied into 3 loops, 2 foot loops (small enough so that they just fit over the boots) and a middle loop into which the tree loop and one end of the ascender are tied. Note in FIGURE 1 that a short segment of tubular webbing is slipped over the middle loop to prevent wear and tear from the ascender. This is because the CMI ascenders have rather sharp angles inside the loops. Alternatively, a locking carabiner could be inserted between the loop and the ascender, which would permit easier removal of the ascender and the tree loop. However, it is safer and also more efficient in climbing to keep the foot assembly as short as possible. There are alternative ways of attaching foot loops to the feet (e.g. Padgett & Smith, 1987; Whitacre, 1981), but ankle loops are required to prevent the feet from sliding out of the foot loops. Ankle loops can be made from 1-inch nylon webbing or purchased ready made. One's boots or shoes must be removed (usually before going into the forest) to put them on. The foot loops of the foot assembly are simply passed down through the ankle loops and over the toes of one's shoes.

One end of the tree loop rope is tied securely in a figure eight and the other end passes through the ascender. The figure eight knot is never untied or removed during climbing. The end of the rope passing through the ascender may be tied off with a bowline knot to one of the tape loops or knotted so that it cannot come loose if the ascender inadvertently opens or malfunctions.

FIGURE 2. The waist assembly, attached to the sit-harness.

The micro-ascender is placed with the flat side against the tree so that its open side exposing the rope faces away from the tree and does not rub against the tree bark. (This normally means that the foot and waist assembly ascenders will be on opposite sides of the tree.)

WAIST ASSEMBLY (FIGURE 2):

- Sit-harness or arborest harness
- Locking carabiner
- Ascender, as in foot assembly
- Rope, static climbing, as in foot assembly, for tree loop

The carabiner connects the waist harness to the tree loop, which has a figure eight at one end and passes through the ascender at the other, as in the foot assembly. The back of the waist harness must have places to clip on extra climbing loops and slings (if one wants to attach to a limb for safety or detach from the tree trunk), hand plant clippers, a line for pulling up the cutting pole, and other equipment.

CHEST ASSEMBLY (FIGURES 3–6):

- Chest harness
- Locking carabiner
- Rope, climbing, 7 or 9 mm, about 2 m long

FIGURES 3–6. Technique of climbing with double loops: (3 upper left) With the waist assembly loop loaded, climber lifts her knees and raises the foot assembly double loop on the tree (the chest harness is too loose on this climber). (4 upper right) After standing, chest loop (once around the tree) is raised. (5 lower left) Leaning back, climber slackens and raises waist assembly loop. (6 lower right) Climber sits and loads waist loop. Next step is to raise knees as in (3).

The rope attached to the chest harness passes only once loosely around the tree. It is attached to the carabiner firmly with a figure eight loop at one end, and more loosely with a bowline at the other. The bowline end can be loosened and adjusted occasionally as the climber moves up or down the tree to adjust the amount of slack. The figure eight end is not untied. This rope has two main functions. The first is to enable the climber to slacken the waist assembly rope, by standing up and arching back against the chest rope (FIGURE 4). The second function is to enable the climber to pass limbs while climbing the tree. Three points of attachment to the tree are necessary if any one point is to be untied.

The tree loop ropes on the foot and waist assemblies should be at least 9 mm, and preferably 11 mm, in diameter. Smaller diameter ropes are too difficult to move upward and result in wearing one's fingertips raw on rough bark. Climbers may wish to wear gloves while doing multiple climbs.

Climbing Technique

ASCENDING. After donning the foot loops and the harnesses, the researcher must secure the chest loop, the waist loop and, lastly, the foot-assembly loop around the tree. One starts up by placing the chest loop high on the trunk, and pushing the waist loop up as high as it will go; then leans back and raises the knees and feet, so that the foot-assembly loop can be pushed up until it is just below the waist loop. It is then possible to stand up and move up the chest loop and then the waist loop (FIGURES 3–6). There must be enough slack in the double loops to allow them to be moved up when unloaded; when loaded they sag down about 40–80 cm. Each loop is moved up about 20–30 cm at a time. The technique is to grab the loop near the ends, and pull it up while sliding ones fingers up the loop to the back of the tree, then switch sides with each hand at the point where the loop crosses itself, and follow the upper part of the loop around to the front of the tree. As the trunk becomes narrower the climber must occasionally pull rope through the ascenders to remove the excess slack.

Getting started on a tree with buttresses or other basal obstructions presents problems, as one has to stand on something to get above these. It is not recommended to climb spiny or extremely irregular trunks. Hand clippers must be carried to cut occasional vines or branches from neighboring trees which obstruct progress. Trees with vines, lianas or epiphytes cannot be climbed without removing these clinging plants.

Trees less than 20 cm DBH are easier to climb than larger trees. Above 30 cm DBH it is difficult to move the rope loops up and it is almost impossible to climb a tree larger than 40 cm using this method.

PASSING LIMBS. When the upper double loop reaches the underside of a limb, the lower loop is raised and then the chest loop is untied and passed over the limb, or around the tree trunk above the limb. Then the double loops are successively removed from the ascenders and replaced around the tree above the limb. The climber must be secured by at least two ropes at all times. If there are many limbs to pass, climbing in this way will be slow, and the climber may find it more convenient to leave the loops and free climb with anchors consisting of loops of webbing or rope on carabiners. Alternatively, the climber may pull up a rope and one or two hand ascenders and use arborist methods (Dial & Tobin 1994). Safety note: The climber should put his or her weight on the chest loop momentarily, and should never use the chest harness as the sole point of anchor attachment because of the possibility of slipping completely out of the chest harness (unless it is attached to the waist harness by a short loop of rope).

DESCENDING. Descending is done with the movements in reverse order. When moving the lower double loop down, one must be careful not to move it too far each time, in case one is not able to slacken and move the waist loop after standing up. If the waist loop is still too high after standing up, the climber must sit down again and move the foot assembly loop back up a certain amount. On average, the rate of descending is nearly twice that of ascending.

LIANAS. The double loop method is suitable for climbing large lianas as well as trees. Lianas should be tested beforehand by having three people hang and bounce on them to make sure that they are still alive and firmly attached. Stiff 11-mm rope loops may slip on lianas with smooth bark, so a flexible 7 or 9-mm rope is recommended for the double loops on lianas. Slipping may also be avoided by passing the rope three times around the liana instead of twice.

Obtaining Specimens

The botanical climber needs to tie the end of a 20-m cord or string to his or her belt loops before starting up, and before climbing too high, the other end must be tied to a 6–8 m pole with a saw or cutter. This job can be done by a partner on the ground. When the climber is within

a pole's length of the specimens desired, the pole is hauled up, and both hands can be used to manipulate it. It is often found that specimens from several neighboring trees can also be reached, and sometimes flowers or fruits not seen from the ground are discovered. The partner on the ground also must be ready to retrieve cut specimens as they fall, especially those which become lodged in understory branches.

Conclusions

The method described here is different from other published methods of climbing trees and has both advantages and disadvantages. The method of ascent is in principle similar to that employed by "Swiss tree grippers" (Mori 1984) which can also be used on straight even boles. The Swiss tree grippers cannot be used on boles as small as 10 cm DBH, however, and they are quite expensive. The equipment required for the present method costs only US$200–300.

The main advantages of double loop method with ascenders are as follows:

1. Does not require installing a vertical rope, which is difficult and time consuming when the vegetation is thick in the lower and middle stories;
2. Does not require much strength or rope climbing experience;
3. Is most suitable on small smooth straight trunks (including palms), which are abundant in rain forests;
4. Does not injure the tree; and
5. Keeps the climber securely attached to the tree so he or she can manipulate a pole or other equipment with ease.

The main disadvantages of double loop method are:

1. Suitable only on straight trees in the 10–30 cm DBH range, and reaches only the middle story of the forest;
2. Trees covered with vines, epiphytes or lianas cannot be climbed without damaging the latter; and
3. Requires technical climbing gear which must be purchased or ordered from mountaineering or outdoor supply stores.

Acknowledgments

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Literature Cited

Dial R. and S. C. Tobin. 1994. Descriptions of arborist methods for forest canopy access and movement. *Selbyana* 15(2): 24–37.

Donahue P. K. and T. M. Wood. 1995. A safe, flexible and non-injurious technique for climbing tall trees. *Selbyana* 16(2): 196–200.

Ingram S. W. and M. D. Lowman. 1995. The collection and preservation of plant material from the tropical forest canopy. Pp. 587–603 *in* Lowman M. D. and N. M. Nadkarni (eds.) Forest Canopies. Academic Press, San Diego.

Moffett M. W. and M. D. Lowman. 1995. Canopy access techniques. Pp. 3–26 *in* Lowman M. D. and N. M. Nadkarni (eds.) Forest Canopies. Academic Press, San Diego.

Mori S. A. 1984. Use of "Swiss tree grippers" for making botanical collections of tropical trees. *Biotropica* 16(1): 79–80.

Muul I. and L. B. Liat. 1970. Vertical zonation in a tropical rainforest in Malaysia. *Science* 196: 788–789.

Nadkarni N. 1988. Use of a portable platform for observations of tropical forest canopy animals. *Biotropica* 20(4): 350–351.

Padgett A. and B. Smith. 1987. On Rope: North American Vertical Rope Techniques for Caving • Search and Rescue • Mountaineering. National Speleological Society, Huntsville, Alabama, U.S.A. 340 pp.

Perry D. R. 1978. A method of access into the crowns of emergent and canopy trees. *Biotropica* 10(2): 155–157.

Yumoto T. 1994. Tree climbing techniques using rope ascenders in tropical forests. Pp. 17–23 *in* Inoue T. and A. A. Hamid (eds.) Plant Reproductive Systems and Animal Seasonal Dynamics: Long-term Study of Dipterocarp Forests in Sarawak. Center for Ecological Research, Kyoto University.

Whitacre D. F. 1981. Additional techniques and safety hints for climbing tall trees, and some equipment and information sources. *Biotropica* 13(4): 286–291.