Canopy Access:
Beyond Basic Single Rope Technique

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Important Note!
It is not the intention of this writer to teach researchers and others how to climb into the forest canopy. This article is intended as a means of acquainting those who may already be exploring the forest canopy with the idea that there are available techniques for climbing of which they may be unaware, or of which they may be aware but not utilizing. Those wishing to climb into the canopy are encouraged to seek professional instruction and discouraged from climbing until such instruction has been received. This writer will not accept responsibility for those choosing to utilize the techniques described herein without having received proper professional instruction beforehand.

Introduction

Over the past twenty to thirty years field biologists have been taking an ever closer look at the forest canopy above our heads (Perry, 1978). The forest canopy has been described as one of the last remaining frontiers for field biologists (Moffett and Lowman, 1995).

The first scientists to explore upwards into this world at the top of the forest employed relatively primitive methods, climbing spurs, or access techniques borrowed from the disciplines of alpine mountaineering, rock climbing, speleology, and from professional arborists. Access at the simplest and most basic level involved only the solitary climber and the tree (Moffett and Lowman, 1995). High tech meant using a length of rope and hardware for ascending the rope.

A typical climb in the canopy usually involved shooting a light line over a limb, using either a slingshot or a bow, and using the light line to haul a heavier line that could then be used to haul a climbing rope up and over the limb. One end of the rope would be tied off to a nearby tree trunk and the climber would ascend into the canopy on the other end of the rope by methods described as single rope technique (SRT) (Smith and Padgett, 1996).

This method had shortcomings in that once the climber reached the limb over which the rope had been placed there were few options for moving about through the canopy (Moffett and Lowman, 1995). The climber could (1) detach from the rope and move about in an untethered state, (2) use lanyards or other short pieces of rope to tie in while climbing about, or (3) simply return to earth and relocate the climbing rope over another limb before making another ascent.

It is surprising to this writer that among the research community there has been little evolution in the methodology used to access the canopy even though the technical/recreational tree climbing community has adopted a variety of techniques that

could allow canopy researchers much greater versatility in their movements above the forest floor.

The purpose of this article is to suggest the employment of several techniques that can expand the abilities of researchers to access and move about within the canopy. It must be assumed that those reading this article are already climbers themselves and in possession of a basic understanding of single rope technique and are familiar with climbing terminology. The article is directed toward the individual researcher who is most likely operating alone or with a small group, and with a limited budget. On the assumption that most researchers will be working in remote locations, the article will also attempt to provide access methodology that calls for minimal equipment that can be easily carried in and out of research areas. This article will attempt to acquaint canopy researchers with techniques that will increase margins of safety for climbers. Some of the techniques suggested will suffice to make the canopy more accessible for researchers with limited physical abilities. This article will not address climbing techniques that violate basic safety protocols. All methods presented herein stress the belief that all canopy access should be accomplished "on rope", and that climbers always work from a position below their anchor point in the tree (Maher, 2004).

The most important purpose of this article is to suggest to the canopy research community that it is time to move beyond the idea that basic single rope technique is the only rope climbing skill that is needed to access the canopy. The time has come that those who venture into the canopy on rope be willing to add to their repertoire of skills and take advantage of the many different methods for climbing that have evolved along with the growth of tree climbing as a recreational activity. Canopy climbers need to accept the idea that there is now a sizeable body of knowledge and technique developed specifically for climbing trees and that it is no longer necessary to confine oneself exclusively to methodology conceived for use by rock climbers, alpine mountaineers, and cave explorers.

Conventional Single Rope Technique

It is not the intent of this article to discourage the use of basic single rope technique. SRT has been, and still is, the method of choice for ascending ropes quickly and efficiently. It is herein proposed, however, that other techniques, when used in concert with, or in place of, basic SRT will enhance the ability of the climber to function more effectively in the vertical environment (Moffett and Lowman, 1995).

Single rope technique exists in many forms. The definitive characteristic of SRT climbing is that it involves ascending a single length of rope through the use of mechanical ascenders or friction hitches. Variations in types of ascenders and friction hitches, and their deployment and configuration on the rope, allow for an almost infinite number of ascent options (Smith and Padgett, 1996).

At the simplest level the researcher may use short lengths of small diameter rope (accessory cord) to attach to the main rope with friction hitches, then ascend by alternately advancing these ropes upward. One of the shorter ropes is attached to the

climber's harness, the other serves as a footloop. First the climber stands in the footloop while advancing the rope attached to the harness, and then sits in the harness while advancing the footloop. This method is described as "prusiking" (Smith and Padgett, 1996)

At the other end of the complexity spectrum are methods that employ mechanical ascenders and a variety of other equipment such as chest harnesses with roller boxes, bungie cords, and stainless steel links configured in a manner making ascent an almost effortless activity (Vines and Hudson, 1999).

Most SRT climbing, as applied to canopy research, will use a system somewhere between these two extremes.

The term “Texas System” is used to describe that technique of ascension most commonly in use among canopy researchers. The “Texas System” involves the use of two mechanical ascenders. One ascender is placed on the rope above the climber and is attached by webbing or small diameter rope to the climber's harness. A second ascender is placed on the rope, usually about waist level, and has a loop of webbing or small diameter rope into which the climber inserts a foot. The climber ascends by standing in the footloop while advancing the upper ascender, then sitting in the harness while advancing the lower ascender. This action is repeated until the desired height in the canopy is achieved.

Descent from the canopy, while climbing SRT, is usually achieved by one of two methods. The climber may downclimb by simply reversing the action of the ascent, or the climber may switch to a descending device and rappel to the ground. The downclimb is slower and safer, the rappel faster and more dangerous. There are a variety of devices for descent and, as with the equipment for ascent these devices span a scale that stretches from very simple to extremely complex.

The simplest recommended device for descent is the carabiner and is utilized by wrapping the rope in a loop, or Munter hitch, through the carabiner. The carabiner is attached to the climber's harness. Downward pressure on the rope beneath the carabiner creates friction on the rope and allows for a controlled descent. At the opposite end of the complexity spectrum are devices with control handles and safety features designed to make the rappel safer and more controlled. Note that all methods of descent employ friction between rope and descent device as the means for maintaining control as the climber travels down (Smith and Padgett, 1996).

In most situations involving canopy access by way of SRT the rope has been placed over a limb with one end tied off to a suitable point at ground level. The other end of the rope is that part of the rope used for the climb.

It should come as no surprise that SRT is the technique most often used for canopy access. It is the method that is most often employed by mountaineers, cave explorers, rock climbers, and professional arborists when it is necessary to ascend on a rope. In

most cases it is the only method that canopy researchers have been exposed to prior to their forays into the treetops (Houle *et al.,* 2004). Conventional single roping does have its downside, however, and that is where other methods may be employed to overcome the shortcomings inherent in its use.

The most obvious issue is that of advancing the climb beyond the entry pitch. If the climber is to follow all safety protocols, then it is impossible to advance beyond the initial entry pitch by SRT unless a second rope or lanyard has been brought along. Bringing along such extra gear violates the idea of equipment minimalism and is unnecessary if the climber has alternative methodology at hand. This is the point at which the climber should be willing to abandon one technique in favor of another.

Another issue is that conventional SRT requires one system and one set of equipment for ascent and another system and set of equipment for descent. Not only is this equipment-intensive, it requires an off-the-ground exchange of systems and paraphernalia, creating a situation in which climber safety can be greatly compromised. There have been methods introduced within the past few years that allow the climber to descend without a major exchange of systems or equipment but these methods have been slow to gain acceptance as they represent a departure from the conventional (Maher, 2004).

The most important negative issue associated with SRT is that it usually involves a rappel as the means of descent. While it is possible to downclimb with ascenders, it is slow and considered impractical when compared to a rappel descent. It is a documented fact, however, that most climbing accidents occur "on rappel" (Maher, 2004). The mature, responsible, and safe climber will treat the act of rappelling as dangerous and will approach any descent with caution.

Finally, conventional SRT requires a degree of training and experience that precludes its use by untrained and inexperienced beginners. It requires a degree of strength, physical condition, and skill usually attainable only by those who climb on an almost daily basis. It also requires an amount of equipment beyond that possessed by the beginning or casual climber.

Most of these negative issues associated with conventional SRT can be avoided if the climber has access to other techniques. Before leaving SRT it is suggested that climbers examine the RAD System as an alternative to the conventional “Texas” style of climbing.

Unconventional SRT: The RAD System

The RAD (Rapid Ascent/Descent) System is an alternative to the “Texas” system that will allow climbers to access the canopy in a manner that will allow both ascent and descent to be accomplished without having to make major changes in equipment. The same equipment that takes the climber upwards can bring the climber downwards, thus eliminating that critical point wherein equipment changeover is taking place. The RAD System also provides the climber with a 2:1 mechanical advantage, decreasing short-term energy expenditure.

To rig the RAD System, begin by placing an ascending device at eye level. This device should have two loops of 9mm accessory cord hanging from its lower end. One loop should be long enough to reach the climber's harness when the ascender is raised as high as the climber can reach. The other loop should reach to the climber's knee when the ascender is raised as high as the climber can reach. Place a large pear-shaped carabiner into the upper port on the ascender with the large end of the carabiner around the rope and through the port. Take a bight of rope from beneath the ascender and thread the rope into a pulley that is inserted into the carabiner. Place a grigri-type-device on the loop of rope that is hanging from between the ascender and the pulley. Attach the grigri-type-device to the climber's harness with a carabiner. Take the shorter accessory cord loop coming off the ascender and attach it to the climber's harness, as the safety back-up, with still another carabiner. The longer accessory loop becomes the footloop. This is the RAD System.

To ascend, one hand should be placed on the handle of the ascender, the other hand on the downrope coming off the pulley. Raise the foot that is in the footloop, allowing slack in the footloop. Raise the ascender as high as the climber can reach. It will also be necessary to allow a bit of slack in the downrope as the handled ascender is raised. The climber will now stand in the footloop while pulling down on the downrope. Rope will be pulled through the grigri and vertical progress captured in the process.

Descent is accomplished by simply removing the rope from the pulley above the climber, then removing the ascender from the rope. The climber is now free to operate the control handle on the grigri device and commence descent. One hand should remain on the downrope below the grigri device to maintain controlled flow of the rope through the device.

Double Rope Technique

The simplest and safest yet least utilized by canopy researchers is double rope technique (DRT). Although double rope technique is slow and energy intensive, it will resolve every one of the shortcomings cited in reference to SRT. In order:

(1) DRT will allow the climber to advance with relative ease beyond the entry pitch and can facilitate both vertical and horizontal movement through the canopy.
(2) DRT utilizes the same system and equipment for ascent as for descent and DRT is suitable for remaining at one spot within the canopy.
(3) DRT descents preclude the necessity of a rappel, avoiding the most dangerous element of climbing.
(4) The climbing rope does not need to be tied off, thus leaving both ends of the rope free to be used alternately while advancing the climb or securing a position within the tree.
(5) DRT is not equipment intensive when compared with SRT and a DRT climb can be accomplished with nothing more than the climbing rope, a harness, and a carabiner.

> (6) DRT climbing does not require the same degree of training and experience as does SRT. Beginners can accomplish major ascents under the guidance of a facilitator with no prior training whatsoever.
> (7) While DRT does require strength and good physical condition, it does not require such to the degree as required for SRT climbing.
> (8) DRT allows the use of both ends of the climbing rope thus making it possible for the climber to have more options at his/her disposal while moving through the canopy. This also precludes the necessity of having to carry an extra rope, since, in effect, DRT climbing gives you the use of two rope ends. (Maher, 2004)

While DRT is capable of resolving many of the issues associated with SRT climbing, it does have shortcomings of its own:

> (1) DRT requires the use of arborist rope; static and dynamic ropes, commonly used for SRT, are neither flexible enough, nor abrasion-resistant enough, to function as DRT climbing ropes. Arborist rope is OK for both DRT and SRT climbing, while static and dynamic ropes are good only for SRT climbing.
> (2) DRT requires a greater length of rope. DRT requires a length of rope that is at least twice the length of the pitch being climbed. The rope must be long enough to reach the anchor limb and return to the climber on the other side.
> (3) A DRT climb requires a clear and isolated route up the tree. The rope must go up and over the anchor limb and return to the climber with no other limbs intervening. Such a route is sometimes unattainable, thus making it necessary to climb with SRT.
> (4) DRT is less efficient ergonomically. Advancing the friction hitch one foot results in an actual net vertical gain of only half a foot. A one hundred foot ascent requires moving along two hundred feet of rope. (Maher, J. 2003, 2004)

While it has been named double rope technique, DRT utilizes a single rope. After placement over a suitable limb in the tree, both sides of the rope are used. The rope end on one side is attached to the rope on the opposite side with a friction hitch. Other knots are added for harness attachment and safety backup. Ascent is accomplished by advancing the friction hitch upwards, thus decreasing the size of the loop in the rope created by the joining of the two sides of the rope. Descent is accomplished by pulling the friction hitch downwards, enlarging the loop in the rope. If the hitch is left alone the climber will hang in a stationery state. A footloop placed on the climbing rope beneath the friction hitch, utilizing still another friction hitch, will help as the original friction hitch is advanced upwards. The climber stands in the footloop to advance the upper friction hitch then sits in the harness to advance the footloop. This sequence is repeated as necessary to advance upward. (Flowers, 2000)

Descent is accomplished by removing the foot from the footloop, grasping the climbing rope between the two hitches, then pulling downward on the upper friction hitch. Control of the descent is maintained through use of the grasping hand.

Most ascents into the canopy begin and end with SRT. The climber in possession of DRT capability will advance beyond the SRT pitch, moving at will through the treetop.

It is possible to make an entire climb using DRT and this methodology is suggested for beginning or inexperienced climbers. At the Institute for Tropical Ecology and Conservation (ITEC), DRT is the first technique taught and climbers who have never been on a rope before routinely make climbs to eighty five feet or higher (Maher, J., 2004). A climber on DRT needs no belay, and once the climb is begun, the instructor can walk away to give instruction to others. The only serious mistake a climber can make is to apply pressure to the top of the upper friction hitch without having a controlling grasp on the rope beneath the hitch. This can result in an uncontrolled descent. Safety knots placed in the rope beneath the climber as the climber ascends can prevent such uncontrolled descents. Safety can be increased by replacing the friction hitch on the footloop with a mechanical ascender. The ascender will act as a safety stop. Using the ascender makes the system more equipment intensive, but a climber prepared for both SRT and DRT will have ascending devices on hand.

In order for the canopy researcher to advance a climb beyond the entry pitch the following use of DRT is suggested. When the top of the entry pitch has been achieved, whether by SRT or DRT, the climb is extended by taking the free end of the rope and placing it over another limb along the intended route of travel, then using DRT to advance to that setting. The climber who intends to do this will have brought along a length of light line and a weight. The climber will also have climbed the entry pitch with the free end of the climbing rope attached to the side of the harness so that it will be easily available when needed. The light throwline, with weight attached, is thrown over a limb along the intended route of travel, usually above the climber, retrieved, then used to haul up the free end of the climbing rope that the climber has thoughtfully brought up into the tree. It is also possible to gain a new setting by tying a monkey fist in the rope itself and using this to toss over an intended setting; monkey fists work very nicely for shorter throws. Once this rope is in place a DRT system is tied in the rope, the system attached to the climber's harness, and the climb continues. Once full weight has been placed on the new system, the original system can be untied, and the climber now has another free end that can be used once the top of the second pitch has been achieved. This is the essence of multi-pitch climbing; the climb can be extended throughout the canopy by alternately using the free ends of the rope to tie new DRT settings. It is possible to advance to any spot in the tree where a safe rope placement has been achieved.

Combining Double Rope Technique with Single Rope Technique

Most experienced canopy climbers will make their entry pitch by way of SRT. If they have done this, and wish to advance their climb beyond the entry pitch by way of DRT, then it is necessary to free the end of the rope that has been tied off to a convenient tree trunk or other anchor point at ground level. In order to observe the safety protocol of

always climbing "on rope" the climber must first tie off in the tree before allowing anyone below to untie from the ground level anchor point. This can be accomplished by taking the free end of the rope, which hopefully the climber has carried along as the climb is made, tossing it over the same limb over which the SRT setting already exists, or over any another convenient and safe limb, tying a DRT system, attaching to it, placing full weight on it, detaching from the SRT setting, then instructing ground personnel to untie the SRT ground level anchor. That end of the rope can then be pulled upward into the tree and a multi-pitch DRT climb can proceed from there.

In the event that the entry pitch involves rope placement along a cleared and isolated route, it is possible to avoid tying the rope off at ground level and the climber will have both free ends of the rope available to advance the climb when the top of the entry pitch is achieved. A clear and isolated route is one in which the rope travels upward to the anchor limb and down the other side with no intervening limbs or other obstructions between the "up" rope and the "down" rope. This is an ideal setting and will allow the climber to anchor the rope at the top of the pitch rather than at ground level. As the rope is hauled into the tree along such a cleared and isolated route, the hauling is halted as soon as the rope has passed over the top of the anchor limb. A small loop is tied into the rope at ground level, a steel link placed in the loop, and the haul line also placed through the link. Hauling continues until the steel link has been pulled snugly against the anchoring limb. The climber may then climb SRT on the side of the rope that has been passed through the link. Once the top of the climb is reached, either end of the rope may be used to rig a DRT setting. The major advantage to this sort of rigging is that the climb can be accomplished without the assistance of ground personnel.

Inability to achieve a clear and isolated route creates a situation in which the rope will probably need to be tied off at ground level. This happens frequently in tropical forest with lianas and dense understory. If the climber does go ahead and rig as described above then it must be understood that the climber will only be able to climb as high as the obstruction between the "up" rope and the "down" rope. This is acceptable as long as the climber is able to get a free end of the rope placed over a suitable setting in such a manner as to facilitate a switchover to DRT.

Combining SRT with DRT allows the climber to make a fast initial ascent into the canopy before switching to another system in order to move about in the canopy.

Double Rope Technique and the "Spider," or double anchor.

Double rope technique allows the climber the use of two rope ends while only having to climb with one rope; in effect this is the same as if the climber had two ropes. Not only does this allow the climber to advance through the canopy while alternately using the two rope ends, it also gives the climber the opportunity to traverse horizontally after creating a double-anchored or "spider" setting. The "spider" technique involves nothing more than having the climber suspended in the apex created by rigging two DRT settings on or near the same vertical level, but separated laterally. The climber is able to move horizontally from one side of the "spider" to the other by advancing forward on one side of the setting while moving away from the other side of the setting. The "spider" also allows the

climber to visit a point in the canopy between two settings. A climber who intends to spend a lot of time at one spot in the canopy can also create an extremely safe stationery position by rigging into a "spider". A climber with DRT settings rigged to both left and right, with no slack in either, while perched on a limb, is in a virtually infallible position of security.

Double Rope Technique and The Third Rope.

The DRT climber not only has the use of two rope ends but a third rope can be realized by utilizing the middle of the rope between the two ends. A daisy rope is a short length of rope usually carried by professional arborists as they climb and is used for tying off in the tree for extra security. The "double daisy" technique is a staple of professional climbers. It is not necessary, however, to carry along an extra rope in order to create a double daisy when climbing. In order to create a double daisy while in possession of only one rope, the climber simply pulls up some of the rope hanging beneath, ties a figure-eight-on-a-bight making a small loop in the rope, and attaches that loop to the harness alongside the already existent DRT connection. A slipknot is then tied in the rope a short distance beyond the figure-eight-on-a-bight, and a large bight of rope pulled through this slipknot. This large bight is then passed around a suitable anchor, either a limb or the tree trunk itself, and the loop inserted into the same carabiner used to fasten the figure-eight-on-a-bight. This creates a "double daisy" that is adjustable by increasing or decreasing the size of the loop created by the slipknot. The friction of the rope passing through the slipknot and over or around the anchor is sufficient to keep the climber in place once slack is taken up in the daisy. The writer has chosen to refer to this system as “The Third Rope." This arrangement is useful as a means of creating a third point of support in situations where the climber may choose to occupy one spot in the canopy for extended periods. It can also be used to secure the climber in situations where it may be necessary to have both rope ends free, or while the climber is in the process of transferring from using one rope end to use of the rope's other end. The arrangement can also be used to advance a climb in place of a standard DRT system when necessary, although descent in such a situation is not easily accomplished due to the increased friction inherent in the double daisy. (Maher, J., 2004)

Summary

Most canopy researchers are using only those methods of canopy access described as conventional Single Rope Technique (SRT). Most canopy climbers are unaware of alternative styles of climbing, most notably double rope technique (DRT). Both SRT and DRT have their shortcomings, both have their strong points. This article proposes the idea that the climber that has access to both techniques, and that is willing to employ either, will be the more efficient and able climber.

Most importantly, canopy climbers need to accept the idea that there is now a sizeable body of knowledge and technique developed specifically for climbing trees and that it is no longer necessary to confine oneself exclusively to methodology conceived for use by rock climbers, alpine mountaineers, and cave explorers.

This article also suggests that in addition to serving as an alternative means of climbing into the canopy, DRT can be used to advance beyond an entry pitch, create a "spider" setting for maximum security and/or traverses within the canopy, and to create a "third" rope when one is needed through use of a mid-line daisy configuration.

The best climbers will be those having the most options at their disposal when challenging climbs are encountered. The best climbers will be those willing to use whatever technique will work best in any given situation. The best climbers will be those who can climb safely and efficiently while having options at their disposal to resolve whatever issues and challenges may be encountered in the canopy.

Acknowledgements

I wish to thank Geoffrey Sorrell, Auburn University graduate student, for suggesting that I write this article and then providing encouragement and editorial support. His assistant, Shawn Lindey, is also deserving of thanks for the same reasons and Carlos Ormond for editorial support.

Dr. Peter Lahanas, Director of the Institute for Tropical Ecology and Conservation, ITEC, and his entire staff have all contributed in one way or another to the knowledge and experience contained herein. Special thanks to Dick Flowers, Abe Winters, Peter Jenkins, Alain Houle, Tim Kovar, Bill Maher and all the other climbers from whom I have learned along the way to becoming a climber myself. A most special "Thank You!" to all of the students at ITEC, too numerous to be named, who have unknowingly served as test subjects as I have experimented with various ways of teaching access into the tropical forest canopy.

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