VARIANT PATHS

Ages of Technology (p. 6) offers a rough "average" of progress through history and prehistory, based on the ancient Near East, Greece, Rome, and Europe. Elsewhere in the world, technology evolved differently. Often it was slower; Paleolithic societies existed at the start of the 20th century! Occasionally it was faster. Define a society's TL by the tools and techniques in common use there – *not* by the calendar date.

Different technologies don't always advance in step. Some societies achieve a TL's overall capabilities without all of its characteristic technologies – and sometimes without its *signature* technology! Variant societies can be described as "retarded in a science." A society can also be "advanced in a science," having one set of techniques usually found only at a higher TL; it might even jump from an early technology to a far more advanced one, skipping everything in between. And it's quite possible for a society to be advanced in certain technologies but retarded in others. In extreme cases, a society's TL may be a rough average of capabilities representative of three or four TLs. Judge a society's TL by its *overall* function, never on the strength of a single technology.

Some examples:

Polynesian Navigators: The Polynesians had Stone Age technology overall, with pre-state social organization and without literacy. But they built boats with sails that could cross the Pacific, and developed navigational methods to guide their voyages. Treat them as TL0 with TL2 seafaring.

The Walls of Jericho: Archaeologists working at the site of Jericho discovered that its oldest relics date to 7000 B.C., in the late Neolithic. The original city covered 10 acres and had massive walls surrounded by a ditch. Its 2,400 inhabitants supported themselves by Neolithic farming and gazelle hunting. Jericho is TL0 with TL1 construction and fortification.

Mayan Astronomers: The Maya were the New World's first civilization, building stone cities and keeping written records. But they didn't have bronze, used few metal tools, and had no draft animals. On the other hand, their mathematics was sophisticated, with a symbol for zero; so was their astronomy. Treat them as TL1 with TL0 materials and TL3 mathematics.

African Metallurgy: The kingdoms of Sub-Saharan Africa didn't pass through a distinct Bronze Age; their metallurgy went straight to iron. But they were otherwise organized like Bronze Age civilizations. Treat them as TL1 with TL2 metallurgy.

Medieval Medicine: In many branches of technology, medieval Europe was more advanced than the Roman Empire, from three-course crop rotation to weapons and armor. But for most of the Middle Ages, it didn't support professional doctors, and it failed to advance beyond the Roman Empire in medicine – and in some ways fell behind it. Treat medieval Europe as TL3 with TL1-2 medicine.

Chinese Advances: Europe entered TL4 around 1450. But in the Middle Ages, Europe wasn't the most technologically advanced society on Earth. Between 1000 and 1450, China developed cast iron; the magnetic compass; mechanical clocks; large seagoing junks that traveled as far as southern Africa; the printing press; paper money; and black powder. It's plausible to put the start of TL4 earlier in China – perhaps in 1250, during the Mongol invasions.

ALTERNATIVE TECHNOLOGIES

What about *making up* technological patterns – those of wholly fictional cultures, or ones that might have arisen had the history of technology gone differently, as discussed on pp. B513-514? The resulting technologies are unlikely to match historical examples perfectly, and probably won't precisely fit the stages that define TL0-4.

ROADS NOT TAKEN

An imaginary society may advance unusually quickly in one technology, developing inventions that historical societies didn't achieve until much later. Such societies can be described as "advanced in a science or art" (see *Variant Paths,* above). For example, if a society comparable to ancient Rome had set aside its prohibitions against dissection and discovered blood circulation, it would have been TL2 but advanced in medicine.

A society may develop technologies that were *never* made workable in the real world, advancing along a different path. Such societies can be described as having a TL such as TL(0+1) or TL(3+1). The +1 means that they brought into regular use inventions that the real-world society that inspired them failed to perfect. For example, ancient Roman armorers experimented with compressed-air cylinders to store energy in catapults; if they had achieved a tight enough seal, the result might have been a TL(2+1) society.

Low-Tech gives relatively little attention to such imaginary TLs. It doesn't consider magical technologies, different laws of nature, or the speculations of people in historical societies. It *does* discuss a few inventions that weren't fully developed, asking what would have happened had they been brought into regular use; such inventions define TLs from TL(0+1) to TL(4+1). **Low-Tech** also notes some inventions that speculative historians and archaeologists suppose might have been achievable by past societies, if they've been shown to be achievable with those societies' resources. For example, Thor Heyerdahl's raft boat that crossed the Atlantic could have been built with Egyptian materials and methods, although most Egyptologists don't believe this really happened.

Harsh Realism for Ranged Weapons

GURPS errs on the side of "heroic realism." For instance, it lets individual archers make shots typical of formations shooting at other formations – in part because it gives low-tech missiles Acc scores comparable to those of high-tech guns. These *optional* rules make life *much* tougher for low-tech missile users!

Malfunctions: Well-designed and properly maintained missile weapons don't suffer from malfunctions (p. B407). Cheaper weapons may, however. Any cheap mechanical missile weapon (e.g., crossbow) has Malf.

15; a cheap bow or sling has Malf. 16. On a malfunction, the weapon *jams* (if mechanical) or *breaks* (if a sling or bow). Thrown weapons are unaffected.

Poor Sling Penetration: Sling bullets have a relatively low velocity compared to firearms. To reflect this, change their damage type from *piercing* to *crushing.*

Reduced Acc: For really harsh realism, *halve* the Acc stats of all non-firearm missile weapons and round *down.* The GM may fine-tune the specific numbers, rounding *up* for weapons with a reputation for accuracy or a superior design.

THROWING KNIFE (p. 77) – *Universal.* True throwing knives rarely have a handguard, often lack a substantial handle, and are balanced for hurling, not fighting. This gives -2 to skill in melee combat. Like all knives, they come in many sizes; the LARGE THROWING KNIFE (p. 77) and SMALL THROWING KNIFE (p. 77) are typical.

THROWING STICK (p. 77) – *Universal.* Any heavy stick balanced enough to throw.

TUBULAR BOW (p. 76) – *India.* A Bow (pp. 72, B275) made of steel tubing, and usually recurved. It's heavier than a normal bow and has less draw length, but it's effectively *rugged* (p. 14): DR 7 and +2 HT. It can survive for many years without maintenance. Historically, tubular bows were SHORT BOWS.

WOOMERA (p. 77) – *Australia.* A notched stick like the ATLATL (pp. 72, B276), but larger; its ammunition is a full-sized SPEAR (pp. 69, B276). The name comes from Australia, but similar weapons exist worldwide. Includes the *amirre* and *mirru* (both Australia).

> *He has prepared his deadly weapons; he makes ready his flaming arrows.*
>
> *– Psalm 7:13*

MUSCLE-POWERED RANGED WEAPON TABLE

This table includes *thrown weapons* (axes, spears, etc.) and *muscle-powered missile weapons* (e.g., bows and slings), from both pp. 72-75 and the **Basic Set.** Each weapon appears under the skill(s) used to attack with it. Some thrown weapons also appear on the *Melee Weapon Table* (pp. 64-71), but use the stats below when hurled. In all cases, "–" means the statistic doesn't apply, while "spec." indicates that special rules apply; see the footnotes. Terms and notation are defined on pp. B268-271, but in brief:

TL: The tech level at which the weapon became widespread in the real world.

Weapon: The name of the weapon or class of weapon; see the matching entry on pp. 72-75.

Damage: The ST-based damage that the weapon inflicts.

Acc: Accuracy, the skill bonus if you take an Aim maneuver before attacking.

Range: If there are two stats separated by a slash, the first is *Half-Damage Range;* at or beyond this distance, halve the weapon's damage roll. The second is *Maximum Range.* A lone statistic is always Maximum Range. Most ranges are expressed as multiples of the wielder's ST – or of the *weapon's* rated ST, for bows and crossbows.

Weight: The weapon's weight, in lbs. For weapons with Shots 1, this is *unloaded* weight, and the weight after the slash is that of one shot. For those with Shots 2+, this is *loaded* weight, and the weight after the slash is that of one full reload.

RoF: Rate of Fire. This is 1 for everything but the slurbow, which shoots multiple projectiles (see p. B409).

Shots: The number of shots the weapon can fire before you must reload. "T" indicates a thrown weapon. The parenthetical number is the number of Ready maneuvers required to reload the weapon or ready another thrown weapon. An "i" next to this means the time listed is *per shot.* See also *Bows and Crossbows in Combat* (p. 74).

Cost: The price of a new weapon, in $.

ST: The minimum ST needed to use the weapon properly; wielders with lower ST suffer -1 to skill per point of ST deficit. "†" means the weapon requires two hands. This *isn't* the ST used to find a bow or crossbow's damage and range. Every bow or crossbow also has a *rated ST,* the ST required to draw and use it at full efficacy, which determines damage and range; see *Bows, Crossbows, and Rated ST* (p. 74). Weaker users can shoot a stronger bow, but will suffer the standard skill penalty and FP loss for using an over-strength weapon. The ST score on the table for a given type of bow or crossbow is the *minimum* rated ST for that type. Rated ST doesn't affect weapon or ammunition weight.

Bulk: The penalty to skill when you take a Move and Attack maneuver (p. B365) or use Holdout to conceal the weapon.

Notes: Applicable footnotes at the end of the table.

Chest/Strongbox (TL0)

A wooden, metal, or stone container used to secure treasure, protect weapons and armor, or store clothing or linens – or sometimes for burial of important people. Consult *Containers and Storage* (p. 34) for the box. To control access, use any of the locks under *Bars, Bolts, Latches, and Locks* (pp. 120-121).

Door (TL0)

A door is a moveable barrier that covers an opening. The earliest evidence for manmade doors appears in paintings in Egyptian tombs. Doors are used to restrict access to certain areas and/or to control temperature by keeping the *weather* from intruding. They can be secured with bars, bolts, or latches (p. 120). See p. B558 for the DR and HP of various materials from which door scan be made.

Some general examples:

Construction	Wood		Ironbound Wood		Iron	
	DR	HP	DR	HP	DR	HP
Light	1*	23	5	27	12	36
Average	2*	29	10	34	25	46
Heavy	3*	33	15	39	50	58
Extra-Heavy	6*	42	30	49	75	66
Vault	12*	54	60	62	150	84

* Wood has *ablative* DR (see p. B47); ironbound wood and iron do not.

Concealed Doors

Concealed doors and secret passages date to the early Bronze Age (TL1). Most are part of a building, constructed when the structure is erected. However, a secret passage may be a later alteration, like the classic prison escape tunnel.

A craftsman must roll against the *lower* of Architecture or Smuggling to design a concealed door. He needs either Carpentry (for wooden doors) or Masonry (for stone ones) at 12+ to build it. To hide a regular door – by moving a bookcase in front, placing a rug over a trap door, etc. – requires the Camouflage skill.

Finding concealed doors takes an active search. The GM rolls a secret Quick Contest for each searcher: the *highest* of Vision, Observation, or *Per*-based Traps vs. the Architecture, Camouflage, or Smuggling skill used to hide the door. Victory reveals the door (if there is one!). *Opening* it may require Search rolls for hidden latches and/or IQ-based Traps rolls for mechanisms.

Spikes/Thorns (TL0)

An early defense involved planting thorny shrubs around a secure area. Like modern barbed wire, such plants are a physical deterrent; they look menacing and slow would-be intruders. Anybody passing through the obstructed area must make a DX-5 roll once per yard. Failure means the barbs tear the victim's skin; he must make a Will roll (at +3 for High Pain Threshold or -4 for Low Pain Threshold) to avoid crying out. (It would take *monstrous* thorns to inflict even 1d-5 cutting damage!) The thorns also snag clothing and equipment; treat this as a Binding (p. B40) with ST 7. Clothing or armor with DR 1+ will prevent tearing but not entangling. The easiest way to cross thorns is to lay something over them – a log, a thick cloak, a body, etc. – and climb across.

Window (TL0)

A window is a hole in a wall to admit light and air. To prevent unauthorized access, it might be covered by a grate (below) or a windowpane – or simply made too small to climb through! Prior to the invention of transparent glass, translucent materials such as horn and paper were used for windowpanes; see *Materials* (pp. 19, 22, 24-25) for the TL and properties of such layers. Wooden or metal shutters could provide additional protection, keeping intruders and the elements out, and warmth in; see p. B558 for typical DR and HP.

Grate (TL1)

A grate is a metal grille that covers an opening. It lets in light and air, but prevents access. It counts as half cover (p. B407): Attacks through the grate in either direction are at -2 to hit specific locations – or strike it *instead* of the target on a roll of 4-6 on 1d, if attacking a random location.

A grate may be fixed in place, hinged like a door, or raised and lowered from above as a portcullis. The following table lists DR for some typical grates, along with HP and weight *for a 10-square-foot section*. Destroying a section allows normal humans to squeeze through one at a time; see *Breaking and Entering* (p. 122) for other important details.

Construction	DR	HP	Weight
Light	6	15	7
Average	9	19	15
Heavy	12	23	25
Extra-Heavy	18	31	60
Vault	24	37	100

The typical castle portcullis is about 15'×20'; that's 300 square feet, or 30 sections. An average example would thus weigh 30 × 15 = 450 lbs. A representative mechanism for such a portcullis can raise it a foot every three seconds or drop it one foot per second, and requires eight men to operate. Cutting the portcullis' rope or chain would let it fall completely closed in a second. Heroically lifting it would use the standard lifting rules (p. B353), in the unlikely event that the barrier lacks a latch or a bar to prevent this.

A *cross-hatched* grate – with additional horizontal bars – has double weight and 25% more HP.

Placing a grate horizontally over a depression in the ground hampers some creatures (notably hoofed animals) from walking over it. Crossing requires a DX roll at the speed penalty for current Move (p. B550); e.g., Move 5 gives -2. Failure means 1d-4 HP of injury to the limb that falls through the grate, doubled if the victim is carrying more than Light encumbrance. Most hoofed beasts will simply refuse to cross such a barrier, but an appropriate skill roll at -4 will overcome this reluctance.

Breaking and Entering

Doors, grates, strongboxes, etc. can be destroyed using *crushing* or *cutting* weapons. Don't bother with attack rolls! Roll damage at +2, or +1 per die, for All-Out Attack (Strong) – plus *another* +1 or +2 per die with Forced Entry (p. B196) at DX+1 or DX+2, respectively. Pry-bars (p. 126) deal swing+2 crushing. Swords dislike such abuse, and have a 3 in 6 chance (2 in 6 if fine, 1 in 6 if very fine) of bending, giving -1 to skill. Subtract the target's DR, multiply by 1.5 if your attack was cutting, and reduce the object's HP until it breaks (see pp. B483-484).

Door and grate DR and HP assume a 10-square-foot breach. This will admit most adventurers. A Skinny intruder requires an opening half as big (20% fewer HP); one with Fat, Very Fat, or Gigantism needs half again the area (15% *more* HP). When attacking the entire barrier – e.g., with a battering ram – calculate HP for a Homogenous object using its *total* weight (see p. B558).

Many doors can be forced with a well-placed shoulder or boot, destroying the attached hardware but not the door. Read the DR and HP of a bolt, hinge, latch, or lock from the "Bolt/Latch" columns under *Bars, Bolts, Latches, and Locks* (p. 120). Roll a Quick Contest: ST vs. object HP. Add Lifting ST, and bonuses for Forced Entry and/or tools (e.g., +2 for a pry-bar), to ST; subtract the hardware's DR. For a barred or wedged door, use the bar or wedge's DR and/or HP with these rules, where these exceed the metal hardware's scores. You must *win* to open the door. Repeated attempts are at a cumulative -1 and cost 1 FP each.

TRAPS

Traps are used mainly to hunt animals, but many can be adapted to catch human prey. The majority have two components: the *trigger* and the *delivery device*. Some also have a built-in bypass mechanism, enabling people in the know to avoid the trap. Most traps require knowledge of the Traps skill (p. B226), but not all call for a skill roll. To conceal traps effectively, use the Camouflage skill (p. B183).

Detecting a trap requires a *Per*-based Traps roll. The GM rolls secretly against the *best* skill in a group to see if they notice each trap.

Modifiers: Acute Vision (p. B35); any darkness penalty; any penalty for a *concealed* trap; -5 if fleeing or rushed.

Disarming a trap involves locating or improvising a bypass mechanism. For most traps, this means a *DX*-based Traps roll.

Modifiers: High Manual Dexterity (p. B59) or Ham-Fisted (p. B138); any penalty for a *complicated* trap; -5 for working by touch (p. B233), such as when the trap is inside a door or a chest and not visible from outside, forcing the burglar to feel for it and attempt to interrupt it *as he opens the door*.

Some traps can be rearmed by making a second disarm roll.

When picking a trapped lock, use the *lower* of Lockpicking or Traps. Success opens the lock and leaves the trap untriggered. Failure means the lock stays shut and the trap goes off.

Most low-tech traps list neither cost nor weight. They're applications of digging tools (under *Mining and Tunneling,* p. 30), rope (in *Rope, String, and Thread,* pp. 23-24), nets (use the ones under *Fishing,* p. 29), etc. The main investment is in labor.

Deadfall (TL0)

A heavy weight – traditionally a boulder or a log – attached to a tripwire (p. 123) or similar mechanism (such as a pressure plate). Activating the trigger drops the weight on the victim! Setting up a deadfall takes an hour plus an additional hour per 100 lbs. of weight it drops. Calculate damage from the deadfall's weight and the distance from which it's dropped (see *Damage from Falling Objects,* p. B431). Roll against Traps to hit the target. Final effective skill can't exceed 9 plus the deadfall's SM (e.g., SM +1 gives a maximum of 10); larger deadfalls are more likely to strike their prey.

Net (TL0)

Net traps work much like snares (p. 123), but cover a wider area and entangle the victim, making it harder to break free. A net for hunting takes 15 minutes to set – or 30 minutes, for large game. A spring trap that can engulf and suspend a man requires 90 minutes.

Someone suspended in a net can break free by being lowered to the ground – where he can disentangle himself – or by severing 2d strands. Since he's tangled in a net, he must make a DX or Escape roll to get his hands free to draw a blade and cut the strands. If he succeeds and subsequently cuts the net, he'll suffer a fall and injury (see *Falling,* p. B431). Failure means he can do nothing for a full minute, after which he can try again. Critical failure means he cannot move at all; somebody else must release him.

Pit (TL0)

A pit is an effective means of trapping prey. Since most creatures won't blithely fall into an open pit, the opening must be concealed – although it might be left uncovered if there's no light by which to see it. Start with the digging times on p. B350 and add 10% to camouflage the opening. Constructing a more complicated cover (e.g., spring-loaded trap door) takes even longer.

Victims of a pit trap take falling damage (see *Falling,* p. B431). Adding sharpened stakes at the bottom converts the damage from crushing to *impaling*.

A shallow pit can slow an enemy's charge on the battlefield. If it's *concealed,* potential victims must win a Quick Contest of Vision vs. Camouflage to spot it in the first place.

BANDAGES

Bandages are used to treat *burning, cutting, impaling,* and *piercing* injuries, and the split skin, small cuts, and abrasions included in *crushing* damage. They enter systematic use at TL1, with ancient Egyptian linen cloth; other fabrics, such as cotton and silk, are also suitable. Various substitutes exist at TL0.

Cobwebs (TL0)

Applying cobwebs to a wound is an old home remedy for bleeding. Treat cobwebs as improvised equipment for First Aid, giving -5 to skill. A successful roll stops bleeding and restores 1 HP – as for *Bandaging* (p. B424) – but provides none of First Aid's other benefits. The web is too flimsy to provide lasting protection or keep out dirt. In fact, cobwebs are seldom sterile; the patient must roll for infection (p. B444), treating a fresh web as ordinary "clean" dirt (+0) and an older one as moderately unclean (-1).

Cobwebs are free. Finding one requires a minute and a Housekeeping or Naturalist roll in a suitable environment. Success locates a fresh web; failure by 1 locates an old, moderately unclean one. Webs are too fragile to store for later use.

Bandages (TL1)

These are cloth wrappings for wounds. Benefits are discussed on p. B424; in addition, bandages can keep dirt out of a wound and prevent infection (see *Infection,* p. B444). A *tight* bandage can substitute for a tourniquet for basic First Aid rolls. A basket of precut clean cloth (typically cotton, linen, or silk) sufficient to dress half a dozen wounds, and which counts as basic equipment for First Aid, is $10, 2 lbs.

Improvised Bandages: At TL0, bandages can be made from the cloth manufactured by some Neolithic societies, or from barkcloth (see *Paper and Its Cousins,* p. 24). Broad, flat leaves are another option, where available; roll against Naturalist as described for finding vines under *Tourniquet* (p. 145), and note that some leaves have medicinal effects (see *Drugs,* pp. 150-152). At TL1-4, bandages can be cut from garments, bedding, etc. Primitive cloth bandages are half-price ($5); leaves and scraps are free. All give -2 to skill and are rarely sterile – roll for infection (p. B444), assuming ordinary "clean" dirt.

First Aid Kit (TL1)

In addition to bandages, this kit contains medicinal substances (see *Drugs,* pp. 150-152) – raw materials for poultices, and infusions or decoctions suitable for making compresses. At TL2+, add ointments, and possibly soap (see *Grooming,* p. 36) for cleaning. Such gear gives +1 to First Aid rolls. $50, 2 lbs.

> *For extreme diseases extreme strictness of treatment is most efficacious.*
> – Hippocrates, ***Aphorisms***

SPLINTS AND CASTS

For broken bones to mend, the rejoined ends must be held together while they heal. Setting the bone requires the Surgery skill (see *Surgical Techniques,* p. 12, and **GURPS Low-Tech Companion 1** for bonesetting rules), but anyone can use First Aid to create a rigid framework for an arm or a leg. A crippling injury won't recover without at least this much treatment.

Splints (TL0)

Flat strips of wood, thick enough for rigidity, placed against a broken limb and tied or strapped in place. Arm splints: $25, 1 lb. Leg splints: $50, 2 lbs.

Cast (TL1)

A cast is made by wrapping a broken limb tightly with bandages and then plastering over it to provide support. Arm cast: $50, 5 lbs. Leg cast: $100, 10 lbs.