BEST ON THE BEACH!

Marines made themselves indispensable when they
- Figured out what went wrong at Gallipoli
- Invented modern amphibious gear
- Foresaw the Pacific War two decades early
da Vinci's DEADLY DEVICES

The master painter was also a military architect who filled sketchbooks with his lethal visions.

Fifteenth century Italy was a tumultuous place, a highly urbanized patchwork of principalities, kingdoms and city-states in perpetual tension with one another. Mob rule was common, betrayal a virtual certainty. The powerful families that pulled the strings hired a cadre of creative minds to fortify their strongholds and develop weapons with which to furnish their mercenary armies.

MULTI-BARRELED 'MACHINE GUN'
Da Vinci sketched this rolling artillery battery around 1480 while in Florence, perhaps as a calling card to a warrior-prince in need of a military architect. A hand crank on the carriage adjusts elevation. Reloading would be a chore.
As the leading Renaissance thinker, Leonardo da Vinci (1452–1519) moved easily among these elite, who prized the Florentine as much for his adept military engineering as for his artistic prowess. A master artist by age 20, da Vinci soon caught the eye of Florentine elder statesman Lorenzo de Medici, who in 1482 appointed Leonardo as a peace envoy to Ludovico Sforza, duke of Milan. Da Vinci spent the next four decades bouncing between patrons in Milan, Venice, Florence, Rome and finally France, painting, sculpting and sketching his weapons of war.

CLAUSER BOMB
Da Vinci’s cluster bomb, above, comprises round shells fitted around iron spacers and stitched inside a pliable casing. Leonardo undertook a study of ballistics in the 1490s. Out of that came remarkable sketches like the one at right, in which he traces the parabolic path of each projectile.
BOMBARD
The bombard was already in use when Leonardo sketched this sleek model in the early 1500s. Its solid base limited the cannon to a single direction of fire.
ARMORED CAR
Four centuries before the advent of the modern tank, da Vinci conceived of this war wagon. Conspicuously absent is a means of propulsion.

Whether any of da Vinci’s killing machines were actually built during his lifetime remains conjecture. Likely not, as to realize his complex schematics would require vast amounts of money and materiel, not to mention laborious trial and error at a time of constant upheaval. He may have constructed working models to test his concepts, but if he did, none survive.

Only his sketchbooks remain, comprising thousands of loose, mismatched pages of notes and sketches that at first glance resemble an art student’s doodles. A closer look reveals intricate mechanical drawings that evince both the dexterity of an artist and the analytical mind of an engineer.

Leonardo was an early proponent of heavy armor. At the heart of his armored car is a classically inspired chariot, as shown in this exploded rendering of his c. 1485 sketch. But soldiers would have been unable to propel such heavy machinery, and Leonardo has left out a cavity to accommodate the expected horse or ox.
In recent years, engineers, adventurers and artists have gravitated to da Vinci's mechanical drawings. Some have built and tested functional models of his machines (see P. 11), and museums worldwide have hosted touring exhibitions of such mock-ups. Among the more high-tech models are the three-dimensional digital renderings of da Vinci's devices shown in this portfolio, by graphic artists Mario Taddei and Edoardo Zanon [www.leonardo3.net]. Viewed alongside the master's original sketches, the images leave one wondering what Leonardo might have accomplished in the digital age.

**SCYTHED CHARIOT**
For shock value, few weapons can match Leonardo's rotating "mammower," pulled into battle by a team of horses, right, with predictably gruesome results.
The scythed chariot is likely another instance of Leonardo drawing to impress potential clients rather than design a truly functional weapon. One can imagine the carnage that would ensue should the noise of battle spook the horses. Da Vinci's own notation reads, "Often they wreak as much havoc on friends as on foes."

In 1482 Leonardo composed a letter of introduction to Ludovico Sforza, seeking to impress the duke of Milan and win appointment as his military architect. Many of the drawings that accompanied his letter (and that appear in this portfolio) are collected in the 12-volume Codex Atlanticus, a 16th century compilation of da Vinci's drawings. To view the codex online, visit [www.ambrosiana.it/ing].