Special Article

On Criticism in Medicine
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Matthew Arnold, the author of *Essays in Criticism* (1), said that criticism is "a disinterested endeavor to learn and propagate the best that is known and thought in the world." This lofty definition, unfortunately, does not apply to our professional world. The statement that criticism is a "published analysis of the qualities and characteristics of a work of literature or fine arts, itself taking the form of independent literature" comes a little closer (if we are willing to think of medicine as a fine art). Indeed, some critical reviews of books or occasional commentaries on social or political phenomena touching on medicine might qualify. The quoted definition comes from the pen of Sir Edmund Gosse (2), who decried that criticism was taking the meaning of censure and of picking holes.

Criticism, in the sense of analysis and of picking holes, provokes our lives. In the newspapers we find political and artistic critiques, in our profession we meet it in Grand Rounds and reviews of grant applications and scientific papers, and at home we may encounter it dispersed by, or we may offer it to, members of the family. Perhaps because it is so common, criticism in our profession has attracted little formal attention. But because carefully balanced critique is indispensable for our professional growth, while intransigent criticism can stifle such growth, criticism deserves study. Such study may include a disinterested endeavor to learn and propagate what is best in criticism as well as an analysis of its qualities and characteristics, or even some censure and picking holes.

Current Targets of Criticism

Bok divides the errors that may be criticized within and by the medical profession into technical errors on the one side and normative errors on the other (3). Examples of technical errors are mistaken diagnoses and faulty techniques. These errors are readily forgiven. Medicine has developed an elaborate system to deal with these errors formally and— to the erring physician—prospectively. A particularly prominent example of the medical community's mechanism to recognize technical errors and to dispose of them—not unlike a religious confession followed by forgiveness—is offered by the Grand Rounds. Here, criticism works so well that its proceedings can be published; the erring physician thanks little of it. That this mechanism has educational motives, i.e., improving the care of patients, I need not mention. Important for our discussion is that a system has evolved for criticizing technical errors in a neutral manner. Indeed, were personal frankness to invade a Grand Rounds exercise, the community of physicians would not condone it.

Not readily forgiven are the normative errors, "errors in assuming a role," "Normative" means establishing a standard and, in this context, it is of behavior and etiquette. When a physician fails to assume the role of conscientious and very available doctor, the profession is not inclined to forgive such a normative error. Some breaches of etiquette between physicians also are classified as normative errors. Examples may help.

A surgeon encounters difficulties during an operation and, in front of others, harshly criticizes his...
assistant or the anesthesiologist and blames him for the trouble. Even if the critique were accurate, timing and style of the criticism are not justifiable. To be effective, criticism must lead toward new knowledge and, where possible, a change in behavior. In order to accomplish this, it must project the dignity of the critic. Harsh public criticism tends to demean and is, therefore, not effective. Critique should be offered where it can be weighed by the criticized and counterarguments can be considered by the critic. That is not possible during a surgical procedure. Criticism should never be vituperative, insulting, or rancorous, lest it inhibit the learning that the critique is meant to foster.

Public criticism of the anesthesiologist by the surgeon will be forgiven—if not repeated too often—after an expression of regret by the surgeon. Such criticism was frequent in years gone by, but not considered a breach of etiquette, just an understandable slip by a person working under stress. At least, that was the pretense. That it was a pretense becomes apparent when we examine the extraordinary phenomenon that the roles of the critic and the criticized were practically never exchanged. Almost never did an anesthesiologist publicly criticize a surgeon, even if stress might have amply justified such criticism of a surgical technical error. I have no good explanation for this other than to point to the influence of history (for many years anesthesia was given by the junior member of the surgical team or by a nurse) and to the magnificence of the fields (surgery tending to attract the aggressive person, who seeks to resolve problems by excising them while anesthesia attracts the quiet one who watches the effects of potent poisons).

Normative errors that will not be forgiven differ only in seemingly minor detail. Under circumstances similar to those described above, a young physican's public criticism of a senior colleague constitutes a breach in etiquette. Forgiveness would be unlikely because the role of the senior physician is sanctified by tradition and attacks on the hierarchy are not tolerated.

Formal Peer Critique

In special areas of medicine, critique is dispensed in a highly formal manner. Peer review bodies are organized either to assess the medical practice of physicians or to judge the scientific research of medical investigators. Partly in response to public concern, partly in recognition that not all physicians monitor the quality of their practice, audits, peer reviews, and self-evaluations have been fostered during the last twenty years. These good intentions often do little more than add paperwork and sometimes petty action to medical practice. The difficulty of assessing quality has not been solved by these attempts. The critique springing from these evaluations focuses on what is easily measured but usually is trivial, rather than on what is difficult to capture but vital to patients and profession. These efforts tend to detect minor errors in following this guideline or that routine, but rarely do they unmask the callous practitioner, the shoddy surgeon, the unattentive anesthesiologist, the careless diagnostician.

The scientific review mechanism is much older and far more successful, if not without its own problems. It is practiced by granting agencies and editorial boards, panels of experts who analyze work and judge it, that is, who attempt an "analysis of the qualities and characteristics of a work." These judgments are translated into granting or rejecting funding or publication.

Carter examined the validity of the scientific peer review governing the NIH (4). She applied these criteria to assess the merit of research endeavors that were the subject of NIH grants: Is the grant renewed, is the work cited, will it help to alleviate disease in the long run? Subsequent reviews by different peers often came to different conclusions than their predecessors, with a correlation coefficient between priority scores on successive evaluations of only 0.4. This has been cited as evidence that NIH monitors well the efforts of its investigators (5), but it may also reflect changing perspectives by new sets of reviewers. Nevertheless, the scientific review process appears to work reasonably well overall.

The scientific review may have its greatest weakness with the young and unknown investigator. Many young investigators have made seminal contributions. Among them are Humphrey Davy, who was 19 when he described N₂O as an anaesthetic; Hervey Hill Hickman, who was 24 when he identified CO₂ narcosis; Crawford Long, who was 28 when he anesthetized Mr. Venable; Horace Wells, who was 26 when he first used N₂O; and William Thomas Green Morton, who was 27 when he first administered an anaesthetic in Boston. What would have been their chances had they been forced first to submit their ideas to a critique by their elders?

The fear of criticism, as well as criticism itself, can stifle. I could not find evidence that Crawford Long delayed the announcement of his success with ether anesthesia because he feared being criticized for reporting prematurely. But such fear may have contributed to the delay. While I am sure that we could discover instances in which fear has prevented the dissemination of all considered reports, I am equally
sure that fear of criticism has delayed or suppressed important scientific announcements. Comor re-
considered Copernicus desired the publication of his De Revolutionibus for fear of criticism by the church (6). There the critique may have proved injurious to the health of the criticizer. A more recent example is told by Forssmann (6), the father of cardiac catheter-
ization. As a resident of F. Saarbruch, one of Ger-
many’s most famous surgeons, Forssmann had the strong impression that independent thinking was re-
garded as dangerous. “Divergent opinions were con-
sidered herey,” he wrote. Thus dogma is not the ex-
clusive domain of the church. Without criticism of
dogma, little progress can be made. But to criticize dogma requires fortitude.

Confidential Criticism
In the 13th century, medicine still reflected a religious
callaracter because for centuries university education and medical practice had been in the hands of the church. But slowly the church lost control. Around 1200, the European universities began to codify their customs into written law (7). Corporations were es-
established that could defend themselves legally and
economically. The Barbers’ Guild, which represented medicine, followed suit and by 1300 the Guild had chosen a supervisor to scrutinize the barbers. Should he “find any of them keeping booths (a problem with some barbers in charge of public baths) or acting unseemly in any other way... . he was to cause the distress to be taken into the chamber” (8). Such de-
velopments paved the way for universities and the medical profession to insulate themselves against out-
side criticism and to resolve conflicts internally rather than to air criticisms publicly. The church continues
to do no less.

Around 1540, King Henry VIII permitted the barber surgeons to incorporate and establish a “College of
Physicians” (9). The profession surely fostered that and, I assume, gladly provided or at least supported the information that led the king to state that “the science and curing of physik and surgery is exer-
cised by a great multitude of ignorant persons.” When the King lamented that many people, “most espe-
cially of them that cannot discern the unwinding from the curing” might come to grievous hurt, the profes-
sion probably had exerted some influence on the King’s thinkig. Under the charter of the Royal College of
Physicians, the profession assumed the duty of main-
taining high standards and guarding the dignity and the good name of the profession. That, of course, meant to defend the profession against attacks from

the outside, against which it had to close ranks. The
physicians in the Royal College could not demon-
strate scientifically that their diagnostic and thera-
pmetic curing was superior to that of the uncunning, ignorant persons. Neither the cunning nor the un-
cunning could muster convincing data at that time. But neither could the barber surgeons counteract criticism from other practitioners or the public. There-
fore, they brought to bear the weight of the Guild’s authority and royal protection.

To this day members of the medical profession are
urged to refrain from acts that jeopardize the au-
thority of their colleagues and to sustain those whose authority is threatened (10). Powerful precedent and ancient history sanctify that custom. Yet, excessive insulation against criticism probably serves medicine poorly. Medicine is such a magnificent field that an educated public would be more likely to support its physicians than to condemn them. Medicine’s prob-
lems should be taken out of the chambers—but not only by law suits and TV shows!

Public Criticism
Public criticism of medicine has waxed and waned over the centuries but never disappeared entirely. Many examples could be cited; among them G. B. Shaw’s well known critique of the self-protection of the professions (The Doctor’s Dilemma) and H. Daumier’s drawings ridiculing the pompous but ineffective phy-
sician. Current criticism merits a few comments. It seems to vary from two wells. On the one hand, physicians are accused—not for the first time in his-
tory—of being a greedy lot who have exchanged high ideals for crass mercantile interests. On the other hand, physicians are pictured as careless and arrogant tech-
nicians whose slipshod methods cause untold agony. Punitive law suits result and the public accepts them as the just dessert for the callousness of cunning practitioners.

Physicians claim these critiques are not justified, should not be generalized, and are brought about by medicine’s having been so successful that patients now expect the impossible. While there may be truth in all of these counterarguments, their enunciation accomplishes nothing. Perhaps medicine fosters sus-
picion by appearing secretive. After all, medical terms have mysterious Greek and Latin roots that laymen
do not recognize, and medicine’s tradition to close ranks when criticized and to keep all grievances in the chambers and out of the public eye enhances the impression that physicians have something to hide. That invites critical examination.
How Medicine Criticizes Quacks and Incompetent Colleagues

Dealing with practitioners of healing arts who are not recognized by allopathic physicians has been troublesome for a long time. Before medicine developed scientific methods by which to assess the therapeutic efficacy of treatment, conflict between allopaths and other practitioners always lay under the shadow of suspicion that competition rather than concern for public welfare nourished interprofessional criticism. Until recently, in American medical journals, many hastily worded comments have appeared against chiropractors; however, legal proceedings have muted the nature of these attacks. In England, acrimonious debates against homoeopathy were frequent in the pages of Lancet of the 19th century. In comparison, a recent critique of homeopathic therapeutics appears almost clinically neutral and factual (11).

More important and more interesting are the ways in which the profession criticizes incompetent colleagues. Such criticism must be offered within the framework of an etiquette of behavior established among physicians. An important figure in formulating such behavior was Percival, who practiced in Manchester in the late 1790s (9). He expressed the hope that a faculty's conduct "might be regulated by precise and acknowledged principles of urbanity and restraint." Addressing the difficult question of what one doctor might interfere with the practice of another, Percival wrote: "When artful ignorance grossly imposes on credulity, when neglect puts to hazard an important life; or 오시능 threats it with still more imminent danger; a medical neighbor, friend, or relative, apprised of such facts will justly regard his interference as a duty." No better nor more eloquent formulation has been published since. Yet, such criticism continues to be one of the most difficult problems confronting the medical profession. We have made great strides in dealing with colleagues incapacitated by drug abuse, perhaps because we can accept it as a disease. But we have yet to learn how to recognize artful ignorance or threatening rashness and how to criticize such erring colleagues successfully.

The Changing Focus of Professional Criticism

During the Renaissance, the sciences were beginning to break with the strictures imposed by blind adherence to the classics. Our colleagues of the 16th century fought dogma with vehemence. Persuasive, unbiased data were not at hand and few were prepared to listen to a gentle critic. Much later, Virchow (12) explained the nature of the conflict in a major address given in 1847: "In the last three decades thoughtful German physicians attempted to re-establish the old bridges between the remaining natural sciences and medicine; thus medicine had not appeared to be a natural science but a branch of natural philosophy and natural history. Virchow believed that natural philosophy and history were stages leading to natural science, the queen of which was physiology. He said: "Natural science presupposes facts, logical thinking and material (for experiments); he added that "naked facts are dubious weapons; it is necessary to know how they were established in order to understand their strength." How little Virchow thought of philoprogenitive physicians who deduced from observation without experimentation and who barked back to established doctrine became apparent when he said, "the natural scientist knows only material things and the properties of material things, anything beyond that he calls transcendental and he looks upon it as an aberration of the human mind!"

Virchow credited Locke's philosophy and its pragmatic realism for desirable developments in the sciences. This throws a fascinating light on the nature of the scientific conflict that was still raging in the mid-1900s. The medical Renaissance was not complete, the rebellion against established dogma continued. Locke was a useful ally in this fight (13). He had said, "It is an idea and useless thing to make it one's business to study what has been other men's sentiments in matters where only reason is to be judged." And elsewhere, "I can no more know anything by another man's understanding than I can see by another man's eyes." Locke's desire to see for himself what is true in the light of reasonable evidence became the pulsing passion that fueled Virchow's fire. Virchow believed that only vehemence criticism would banish the old and establish the new experimental scientific approach. In support of this sentiment he quoted Reinhard's attack on the defenders of the old ways (14): "It is high time by means of continuous experimentation and a poker and exceedingly rude critique to put a stop to their nonsense!" In the same journal, Virchow flattered the United States: "Had Columbus adhered to the old beliefs of the colliers and had he, therefore, ascertained that there were no other coasts because he could not see them, and had all other people after him been equally tardy spirits, the United States, the land of common sense, would not exist." In this call for exploration Virchow used two English words, "cognition sensus," in the otherwise German text.
The "and of common sense" had publicly and officially embraced freedom as a governing principle of all human affairs and rejected strictures on the human spirit. Perhaps that explains why the American medical literature of the 19th century was far more tolerant and permissive than true for the English or German counterparts. Famous American physicians such as Jacob Bigelow and Oliver Wendell Holmes were noted for their circumstantial language. Indeed, Rothstein blames their taciturn manners for their lack of success against the heroic therapies of their days (15). But these were exceptions (6). In 1843, Oliver Wendell Holmes presented evidence that childish fever was contagious. He was criticized by C. L. Meigs, Professor of Midwifery at Jefferson Medical College. He scorned Holmes's deductions as characteristic of the "jejunum and fruitless vaporing of sophomoric writers." Meigs preferred to attribute the deaths to "accident, or providence, of which I cannot form a conception, rather than to a contagion of which I cannot form any clear idea, at least as to this particular malady." Thus even in the country of common sense, evidence contradicting dogma could not always be assessed coolly.

The Evolution of Criticism

There is an etiquette of criticism just as there is an etiquette of table manners. During the last few centuries, the etiquette of both has changed dramatically: we may gain an impression of how different behavior is today from that accepted and hence expected, say, in 1500. In a delightful book on etiquette we read that well-bred Europeans would not spit onto the dinner table—that was considered crassly rude. If you had to spit during a meal, you turned and spat behind you, taking care not to hit anyone. To swallow what should be spit was considered unhealthy and hence improper. This should prepare us for the differences between the past and present etiquettes of written critique in the medical world. Among my favorite examples of early spitting criticism is that between Paracelsus and his detractors. Paracelsus, the famous physician and experimental pharmacologist of the 16th century, was a thorn in the side of the establishment because he broke with the tradition of the classics and recommended experimentation and observation. For his heresies he was dismissed from his teaching post at the University of Basel. Some of his more vocal critics charged that he was a drunkard and that his pig had bitten off his testicles! Paracelsus was no more gentle when he was a critic. He wrote (17), "Indeed, there is not a desperate hand-saw, brewhouse keeper or dog-killer but wants to sell his human or dog dripping for gold and heal all diseases with it."

By the 19th century, references to anatomical or digestive details had disappeared from written medical critiques, but the language was still harsh; the censure, not satisfied with addressing the substance of the matter, seemed bent on casting aspersions on the author. Dramatic examples from England and Germany abound. Here is a typical quote from a letter to the editor of Lancet (18): "I beg to leave...to inform E. W. that this statement...is incorrect, unimportant, and diametrically opposite to the careful, accurate and conclusive experiments...And I am firmly convinced that everyone who maturely and deliberately examines...the data...must come to the palpable and unequivocal conclusion, that there is a fundamental error...with E. W...and the inferences...must be rejected as false, fallacious and totally inconsistent with sound inductive reasoning. In fact, sir, every argument that ever has been adduced by those pseudophysiologists who advocate the macular...of the arteries...serves to exhibit the utter futility and absolute absurdity of the puerile notions which they entertain."

The critique was signed "latros," a pseudonym. While such anonymous letters were common in Lancet, other authors had signed critiques published in pamphlets and distributed them widely. Probably as a means of advertising their skills to the public (19), a custom not condoned by the medical societies. Prominence did not make for gentility of criticism. Rudolf Virchow accused his equally famous colleague, anatomist-pathologist Henle, of constructing hypotheses based on others' experiments and observations. Henle called Virchow a "negative spirit" before whom nothing was sacred (20). He wrote, "It is the worst of some writers...whose thinking is only...amateurish...to honor as labors only those activities in which eye and hand...and at most the legs too...are active." Virchow complained that Henle's criticism was personal rather than scientific and he wrote, "with determination and perseverance will I fight the destructive methods that Henle attempts to introduce into pathology" (21).

Now compare the language of Paracelsus, latros, Virchow, Henle, and Meigs to the medical criticism published in our century. Politely we now swallow our spittle and—at least when we write—also our ire!

Verbal Criticism

When I compare the verbal with the written criticisms of today and assume an equal difference between the verbal and the written criticisms of the 16th century,
I cannot imagine what verbal criticism was like at that time—my vocabulary of nasty things soon wore dry. I do not know how a barber surgeon would have criticized a hapless apprentice who spilled the zone of the surgeon's best paying patient. But, from personal experience, I do know what, under comparable circumstances, is said in modern teaching hospitals. I remember two examples, one amusing and the other distressing. The first was a discomfited American surgeon known for short-tempered outbursts in the operating room and a seemingly inexhaustible repertory of expletives in which the anatomy of rats' animals played a significant role. When he demanded an assistant, he rarely settled for a single demotion but usually invoked the more terrifying, double dans. He commonly expected more of his associates than they were able to render, try as they may. In one unforgettable incident, he had finally succeeded in the difficult exposure of the common bile duct of an obese patient; but, when he brought the scissors into the field to cut whatever he planned to cut, he misjudged and, instead, deep in the bile, cut a vessel. He looked at his thunder-struck assistant and roared, "Double dumb your! You are supposed to protect me from these nasty rats!"

The disheartening example was provided repeatedly by a surgeon in a Catholic hospital staffed by nuns. On the Mayo stand for all upper abdominal operations, the scrub nurse, a superb surgical assistant and nun, always sternly prepared a breaker with rolled sponges and a separate Kelly clamp. She knew that no such surgical procedure could end before this surgeon would lose his temper, fling instruments into the operating room, and curse her in a most sacrilegious and insulting manner. That would make her cry and she would have to dry her tears before they dropped on her sterile gown or the field to contaminate her or the instruments. So she would grasp the prepared rolled sponge with theXtended clamp, dab her tears, and dispose of the contaminated sponge.

In both examples, technical errors triggered vehement personal attacks instead of a dispassionate critique of what went wrong and how to correct it. Of course, scathing criticism is not limited to or typical of any specialty. Nor is it predominant. I know many senior and junior colleagues in different fields who exhibit exemplary patience with clumsy assistants, uninformed students, or tardy nurses. If medicine were less tolerant of its uncoordinated and inconsiderate members, reference to the critiques of criterion in medicine would be less urgent.

The Components of Criticism

Let us now look at the ingredients of constructive criticism as we would wish it to be in our profession. It should judge a situation or work; identify missing information; and advise how to improve the work. The wise teacher will stress one or the other aspect of this triangle of constructive criticism. For example, when a medication was judged to be inappropriate, a critic might say, "This drug is not appropriate in this dosage for this patient (judge), because Smith has shown in 1981 that it is not well tolerated in patients with this disease (identify); instead I would prescribe such-and-such (advise)."

Unfortunately, that does not always happen. Instead, even today, criticism is sometimes still stilted by personal attack rather than characterized by dispassionate analysis, which leads to a few words about three highly undesirable motives behind some blemished medical criticism.

Defensive. Much criticism is offered in defense of the old and as an attack on the new. It is understandable why some fear and criticize the new; it threatens established authority, which is a strong motivation to defense.

Belittling. The need to belittle is often a part of defensiveness and of vanity, which exists in great detail that which is familiar. What is unfamiliar, in comparison, is kept at arm's length where it appears smaller; just as mountains are rendered small and unimposing through the agency of distance.

Rancor. Rancor and scorn make the worst forms of criticism. They don't simply distr act the critical issue as defensiveness and belittling do. They deflect attention from the issue to the uncontrolled emotion of the critic and the discomfort of the criticized. Rude critics claim a need to vent their anger; but by venting their spew, they indulging their emotion rather than correct an error. When they denounce the criticized, they scrutinize the person rather than the work and turn criticism to destructiveness. While scorn, scurrilistic, and dehumanization are sometimes defended as successful educational practices, a deterrent equivalent to sparking, they do not foster critical reasoning among adults but, instead, train the student to react by reflex, i.e., without thought, and thus stifle learning.
Conclusion
In our private and professional lives, in the arts, poli-
tics, and in the sciences, criticism surrounds us. As
physicians we depend on it because we must deal
with errors, we must analyze scientific work, and we
must censure quacks and reckless colleagues.
Perhaps we should call our habitat terra critica rather
than terra firma and our species homo criticus rather
than homo sapiens. That might draw attention to our
evolution, which has been marked by extraordinary
changes in anatomy and physiology hundreds of
thousands of years ago and by equally drastic changes
in our way of criticizing in the last few hundred years.
In just the last century, written criticism in art and
science (but not necessarily in politics) has become
polite, and personal references to the author are no
longer de rigueur.

The one area that still recalls bygone times is ver-
bal criticism as practiced by some. Even in the dusk
of the 20th century, personal attacks rely heavily on
anatomic details and digestive or reproductive func-
tions. While this is regrettable, we may take heart:
the evolution of criticism clearly points to better days.
Evolution will sweep us along a trajectory already
completed by written criticism. I foresee the next stage
of verbal criticism to take its cue from the written
criticism of the romantic era as it was practiced in the
early 19th century. Here, for example, from 1818, is
what may be the best written, longest single sen-
ence, with the greatest concentration of cutting rancor
(22):

“Our hatred and contempt of Leigh Hunt as a writer
is not so much owing to his shameless irreverence to
his aged and afflicted king—to his profligate attacks
on the character of the king’s son—to his low-born
intolerance to that aristocracy with whom he would in
vain claim alliance of one illusory friendship—to his
paid pandering to the lusts of passions of that mob
of which he is himself a fiend—than to the leprous
crust of self-conceit with which his whole moralbeing
is indurated—to that loathsome vulgarity which con-
stantly clings round him like a vermedis garment from
St. Giles—to that irritable temper which keeps the
unhappy man, in spite even of his vanity, in a per-
petual fret with himself and all the world besides;
and that shows itself equally in his deadly enmities and
capricious friendships—our hatred and contempt
of Leigh Hunt, we say, is not so much owing to these
and other causes, as to the odious and unnatural har-
letry of his polluted muse.”

Once verbal criticism has advanced to a style in
which personal attacks are oiled in well-timed
phrases, we can look forward to the next evolutionary
phase, when we no longer accuse each other of low-
born insolence or foppish vaportory, but when in-
stead acknowledged principles of urbanity and rec-
ti tude govern professional behavior. Then verbal cri-
ticism will be constructive and will be directed at the
act rather than the actor. After all, with scientific proofs
available to us, we no longer enjoy the excuses for
the harsh personal attacks that served our illustrious
forefathers.

In the meantime, we should take a scientific look
at our criticism. When we find ourselves harshly criti-
cized, we should attempt to date the criticism we
receive. Eloquent but personal criticism should make
our critic at home in the early to mid 19th century,
personal attacks including reference to digestive or
reproductive functions should place him in spring
distance of two centuries earlier.

But to the critic who analyzes our work without
prejudice, who troubles us by identifying what we did
not know, and who gently advises us how to proceed,
we bow. He or she is of the future.

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