



Sarpakshi (Nakuli) in Ayurveda: A Critical Review of Classical Perspectives, Botanical Identity, Phytochemistry and Contemporary Pharmacological Evidence

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Abstract : Background: *Sarpakshi* is an Ayurvedic drug that the Nighantu literature describes as pungent and bitter (astringent in one entry), hot in potency and specifically indicated against *visha* (animal poisons, notably from snakes, spiders, scorpions and rodents), *krimi* (worm infestation) and *vrana* (wounds and ulcers). Its botanical identity remains disputed, and *Ophiorrhiza mungos* L. (Rubiaceae) is the most widely accepted source.

Objective: To integrate classical Ayurvedic descriptions with botanical, phytochemical and pharmacological evidence, including recent studies, and to identify research gaps.

Methods: A narrative review of Nighantu texts and commentaries, standard reference works and indexed experimental literature published up to September 2026.

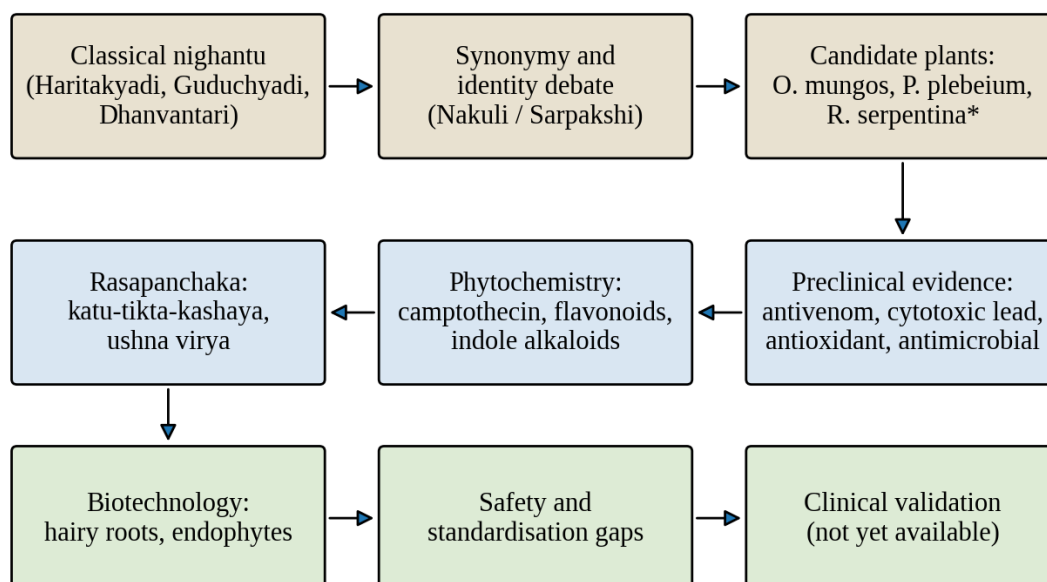
Findings: Classical sources give consistent *rasa*, *virya* and *karma* profiles for *Sarpakshi* and *Nakuli*. Modern work identifies camptothecin (297.94 µg/g dry weight in one variety; 890–3200 µg/g in hairy-root cultures) together with flavonoids such as luteolin-7-O-glucoside and other indole alkaloids. Preclinical data support antivenom, antioxidant, antiviral and antimicrobial activity and a role as a source of anticancer leads, and studies from 2023–2026 extend this to green nanotechnology and camptothecin-producing endophytes. No controlled human trial was identified.

Conclusion: Classical claims on *visha* are partly supported by experimental data, whereas claims on *krimi* and *vrana* remain untested. Authentication, standardisation and safety studies should precede clinical claims.

IndexTerms - *Sarpakshi*, *Nakuli*, *Ophiorrhiza mungos*, Nighantu, camptothecin, antivenom

I. INTRODUCTION

Dravyaguna describes a drug through its name and synonyms (*pariyaya*), taste (*rasa*), post-digestive effect (*vipaka*), potency (*virya*) and action (*karma*). *Sarpakshi* is a *dravya* whose classical description is clear but whose modern botanical equivalent is debated. The classical commentary, standard reference works and lexical sources link the name to *Ophiorrhiza mungos* L., *Polygonum plebeium* R.Br. and *Xanthium strumarium* L. [1–4], and the name is also recorded as a synonym of *Durva* [5]. The drug matters for two reasons. First, its traditional role in poisoning and snakebite (*sarpa-visha*) addresses a neglected tropical health problem for which low-cost adjuncts are sought [6]. Second, *O. mungos* yields camptothecin, the parent compound of the topoisomerase I-inhibiting anticancer drugs topotecan and irinotecan [7,8]. This review reads the classical description alongside the modern data to test how far the two agree; its conceptual framework is outlined in Figure 1.



**R. serpentina* is *Sarpagandha*, a distinct drug that is sometimes confused in the commentary literature

Figure 1. Conceptual framework of the review, from classical description to clinical validation

II. METHODOLOGY OF THE REVIEW

This is a narrative review with two evidence streams.

Classical stream: the *Nakuli* entry (*Haritakyadi varga*) and the *Sarpakshi* entry (*Guduchyadi varga*) of the Bhavaprakasha Nighantu with its Hindi commentary [1,9] were consulted. Verse-level information from the Dhanvantari Nighantu (*Karaviradi varga*) [10] and the Priya Nighantu [11] was taken from the cited editions and secondary Ayurvedic compilations. Synonyms and proposed botanical identities were cross-checked against secondary Ayurvedic compilations, standard reference works and lexical databases [2,4,5,12].

Modern stream: indexed databases and publisher platforms were searched for *Ophiorrhiza mungos*, *Sarpakshi*, *Nakuli*, camptothecin, antivenom, endophytes and green synthesis, with emphasis on peer-reviewed reports published up to September 2026. Primary Sanskrit manuscripts and the Charaka Samhita, Sushruta Samhita and Raja Nighantu were not independently consulted, and no formal systematic protocol or quality scoring was applied. These are limitations of the review.

III. AYURVEDIC PERSPECTIVES ON SARPAKSHI

3.1 Textual sources

The Bhavaprakasha, a 16th-century treatise by Bhavamishra, contains a Nighantu section that addresses many controversies on the identity of medicinal herbs and is one of the most cited Ayurvedic materia medica [12]. Within it, the drug appears under two headings. Under *Haritakyadi varga*, the entry on *Nakuli* (verses 165–166 in the edition consulted) lists *Sarpakshi* and *Bhujangakshi* among its synonyms, and the Hindi commentary discusses it together with the *Sarpagandha/Nakulakanda* controversy [1]. A separate description of *Sarpakshi* is placed in *Guduchyadi varga* (verses 267–268) [9], and a parallel description occurs in the Dhanvantari Nighantu (*Karaviradi varga*, verses 93–94) [5,10].

3.2 Nomenclature and synonyms (*paryaya*)

Names in the tradition are descriptive, and the classical entries and synonyms are summarised in Table 1:

Sarpakshi and *Bhujangakshi* – “snake’s eye”.

Vishanashini and *Vishamardini* – “destroyer of poison”.

Nakulesta – “dear to the mongoose”, echoing the folk belief behind the English name “mongoose plant” [1,2,10].

Gandhanakuli and *Nagasugandha* – “the aromatic root”.

Table 1. Classical entries and synonyms associated with *Sarpakshi* / *Nakuli*

Text and location	Entry	Synonyms recorded	Source
Bhavaprakasha Nighantu, <i>Haritakyadi varga</i> (v. 165–166)	<i>Nakuli</i>	<i>Nakuli</i> , <i>Surasa</i> , <i>Nagasugandha</i> , <i>Gandhanakuli</i> , <i>Nakulesta</i> , <i>Bhujangakshi</i> , <i>Sarpakshi</i> , <i>Vishanashini</i>	[1]
Bhavaprakasha Nighantu, <i>Guduchyadi varga</i> (v. 267–268)	<i>Sarpakshi</i>	<i>Sarpakshi</i> , <i>Gandali</i> , <i>Nadikalapaka</i>	[9]
Dhanvantari Nighantu, <i>Karaviradi varga</i> (v. 93–94)	<i>Sarpakshi</i> / <i>Gandhanakuli</i>	<i>Mahasugandha</i> , <i>Suvaha</i> , <i>Gandhanakuli</i> , <i>Sarpakshi</i> , <i>Nakulesta</i> , <i>Chatraki</i> , <i>Vishamardini</i>	[5,10]
Lexical databases	<i>Sarpakshi</i>	Also a synonym of <i>Durva</i> ; also linked to <i>Meenakshi</i>	[4,5]

3.3 Rasapanchaka and karma

The *Nakuli* verse of the *Haritakyadi varga* describes the drug as astringent (*kashaya/tuvara*), bitter (*tikta*) and pungent (*katu*) and hot in potency (*ushna virya*), and as destroying the poison of snakes and spiders, along with worms and wounds; the verse

and its commentary also mention scorpion and rat poisons and fever (*jvara*) [1,9]. *Ushna virya* is likewise recorded in the Priya Nighantu [11]. The Guduchyadi description of *Sarpakshi* is pungent, bitter and hot, worm-destroying (*krimi-nikrintana*), antidotal to scorpion, rat and snake poison (*vishaghna*) and wound-healing (*vrana-ropana*) [9]; the Dhanvantari entry gives the same *rasa* and actions (*krimirogajit*, *vishaghna*, *vrana-ropana*) but does not state the *virya* [10]. These profiles are compared in Table 2.

Table 2. *Rasapanchaka* and *karma* of *Nakuli* and *Sarpakshi* in classical sources

Source entry	Rasa	Virya	Karma / indications	Source
<i>Nakuli</i> (<i>Haritakyadi varga</i>)	<i>Kashaya, tikta, katu</i>	<i>Ushna</i>	<i>Visha</i> of snake, spider, scorpion and rat; <i>krimi</i> ; <i>vrana</i> ; <i>jvara</i>	[1]
<i>Sarpakshi</i> (<i>Guduchyadi varga</i>)	<i>Katu, tikta</i>	<i>Ushna</i>	<i>Krimighna</i> ; <i>vishaghna</i> (scorpion, rat, snake); <i>vrana-ropana</i>	[9]
<i>Sarpakshi</i> (<i>Dhanvantari Nighantu</i>)	<i>Katu, tikta</i>	Not stated in the edition consulted	<i>Krimirogajit</i> ; <i>vishaghna</i> (scorpion, snake and others); <i>vrana-ropana</i>	[10]

Vipaka, *guna* and *doshakarma* are not stated in the verses and commentary consulted.

By Ayurvedic reasoning, drugs with *katu* and *tikta rasa* and *ushna virya* are generally regarded as *kapha*-reducing, wound-cleansing (*vrana-shodhana*) and anti-parasitic (*krimighna*). This is an interpretive inference from general Dravyaguna principles rather than a statement in the cited verses, and it should be read as a hypothesis for future textual study.

3.4 Place in Ayurvedic toxicology (*agada tantra*)

Ayurveda classifies poisons as plant-mineral (*sthavara*) and animal (*jangama*). Snakes, spiders, scorpions and rodents are classic sources of *jangama visha*, and *Sarpakshi* and *Nakuli* are placed among antidotal (*agada*) drugs in this domain through their *vishaghna karma* [1,9]. For the related root *Sarpagandha*, the commentary gives 10–20 g of root ground in water for snake poison, with local application of the paste [1]. No comparable dose, dosage form or *anupana* for *Sarpakshi* itself is given in the sources consulted, which is a gap for dosage-form research.

3.5 The identity problem (*dravya nirnaya*)

The commentary describes *Nakulakanda* as a doubtful herb (*sandigdha vanaushadhi*) among physicians. Some authors equate *Nakuli* with *Aristolochia indica* (*Ishwari*) and others with *Rauvolfia serpentina* (*Sarpagandha*, also called *Nakulakanda*), while a footnote on Madras-region usage names *Ophiorrhiza mungos* Linn. for *Sarpakshi* [1]. A standard dictionary of Indian medicinal plants likewise gives *Sarpakshi* as the Ayurvedic name of *O. mungos*, regards *Gandhanakuli* as a wrong synonym that is equated with *A. indica*, and records *Sarpakshi* as a confusing synonym for *P. plebeium* [2,3]. Online lexical glossaries add *Vanda tessellata* and, citing the Raja Nighantu, *Andrographis paniculata* as identities of *Nakuli* [13], and list *X. strumarium* under *Sarpakshi* [4]. The candidate identities are listed in Table 3.

Table 3. Candidate botanical identities reported for *Nakuli* / *Sarpakshi*

Botanical name	Family	Context of identification	Source
<i>Ophiorrhiza mungos</i> L.	Rubiaceae	<i>Sarpakshi</i> in Madras-region practice and in standard reference works; most widely accepted identity	[1,2]
<i>Rauvolfia serpentina</i> (L.) Benth. ex Kurz	Apocynaceae	<i>Nakulakanda</i> / <i>Sarpagandha</i> ; treated as a separate drug in the commentary	[1,13]
<i>Aristolochia indica</i> L.	Aristolochiaceae	<i>Ishwari</i> ; equated with <i>Nakuli</i> by some authors and with <i>Gandhanakuli</i> in a standard dictionary	[1,2]
<i>Polygonum plebeium</i> R.Br.	Polygonaceae	Alternative (“confusing”) synonym of <i>Sarpakshi</i>	[3,4]
<i>Xanthium strumarium</i> L.	Asteraceae	Listed under <i>Sarpakshi</i> in a glossary	[4]
<i>Vanda tessellata</i> (Roxb.) Hook. ex G.Don; <i>Andrographis paniculata</i> (Burm.f.) Nees	Orchidaceae; Acanthaceae	Listed under <i>Nakuli</i> in lexical sources	[13]

3.6 *Sarpakshi* versus *Sarpagandha*: why the distinction matters

The commentary describes *Rauvolfia serpentina* at length: a bitter, sedative, hypnotic, antipyretic, uterine-stimulant root with antidotal use in snakebite, used for hypertension, insanity and insomnia. It reports total root alkaloids of 0.8–1.3% (ajmaline, ajmalicine, serpentine, serpentinine), notes adulteration with *R. canescens* and *R. densiflora*, and lists cautions in ulcerative colitis, colicky pain, renal colic and depression [1]. Table 4 contrasts the two drugs. Confusing them is not merely academic: a hypotensive, sedative alkaloid drug and a camptothecin-bearing drug have different risk profiles.

Table 4. *Sarpakshi* (*O. mungos*) compared with *Sarpagandha* (*R. serpentina*)

Feature	<i>Sarpakshi</i> / <i>Nakuli</i> (<i>O. mungos</i>)	<i>Sarpagandha</i> (<i>R. serpentina</i>)
Family	Rubiaceae	Apocynaceae
Key classical actions	<i>Vishaghna</i> , <i>krimighna</i> , <i>vrana-ropana</i> [1,9]	Sedative, hypnotic, antipyretic, antihypertensive, antidotal [1]
Signature chemistry	Camptothecin, flavonoids, indole alkaloids [7,14]	Ajmaline, ajmalicine, serpentine, serpentinine (0.8–1.3% total) [1]
Principal modern use	Antivenom and anticancer-lead research [6,15]	Hypertension and mental disorders [1]
Main cautions	Cytotoxic alkaloid (camptothecin); gastric irritation at high doses reported in popular sources [7,16]	Colitis, colic, renal colic, depression [1]

IV. BOTANY AND DISTRIBUTION

O. mungos is an erect annual herb that roots at the lower nodes. Its leaves are elliptic to elliptic-lanceolate, about $7-15 \times 3-6$ cm, with an acuminate apex and hairs on the veins beneath; the flowers are white with pink-tinged lobes and are borne in dense, terminal, branched scorpioid cymes, and the capsule is obcordate and laterally compressed [17]. In India the species occurs in the Khasi Hills, the Western Ghats and the Andaman Islands [2]. The genus *Ophiorrhiza* comprises several hundred species across tropical and subtropical Asia and the Pacific, with the Western Ghats and north-eastern India as notable centres of diversity [7]. Roots are largely collected from the wild by traditional healers, and the species has been described as near threatened, which raises conservation concerns [18].

V. PHYTOCHEMISTRY

The roots contain starch, a resin and small amounts of a bitter amorphous alkaloid; β -sitosterol and two ergosterols have been identified in the root, and the leaves and stems contain traces of hydrocyanic acid [2]. Preliminary screening of alcoholic extracts is reported to show alkaloids, carbohydrates, glycosides, phytosterols, phenolics, tannins and flavonoids [16]. Root extracts used in antivenom work additionally showed terpenes and quinones, with saponins not detected [6]. The flavone glycoside luteolin-7-*O*-glucoside has been isolated from the leaves [19]. The genus produces monoterpenoid indole alkaloids, and roughly 50 alkaloids have been isolated from *Ophiorrhiza* plants [20,21]. The major constituents are summarised in Table 5.

Table 5. Major constituents reported from *Ophiorrhiza mungos*

Class	Examples and quantitative data	Part / extract	Source
Camptothecinoids	Camptothecin; 10-methoxycamptothecin; 297.94 ± 2.27 $\mu\text{g/g}$ DW (var. <i>angustifolia</i>)	Methanol extract	[14,15]
Other indole alkaloids	β -Carboline and strictosidine-type alkaloids	Genus level	[7,20]
Flavonoids	Luteolin-7- <i>O</i> -glucoside	Leaves	[7,19]
Sterols	β -Sitosterol; 5α -ergost-7-en- 3β -ol; 5α -ergost-8(14)-en- 3β -ol (as ester)	Root	[2]
Phenolics, coumarins, steroids, terpenoids	Detected in hexane and methanol extracts	Whole plant	[14]
Quinones, tannins, glycosides	Detected; saponins absent in root extracts	Root	[6]

Camptothecin content varies widely with the system studied (Figure 2). Whole-plant methanol extract of var. *angustifolia* gave 297.94 $\mu\text{g/g}$ dry weight [14], while hairy-root cultures produced $890-3200$ $\mu\text{g/g}$ [22]. HPTLC surveys confirm that camptothecin content differs between *Ophiorrhiza* species of the southern Western Ghats [23].

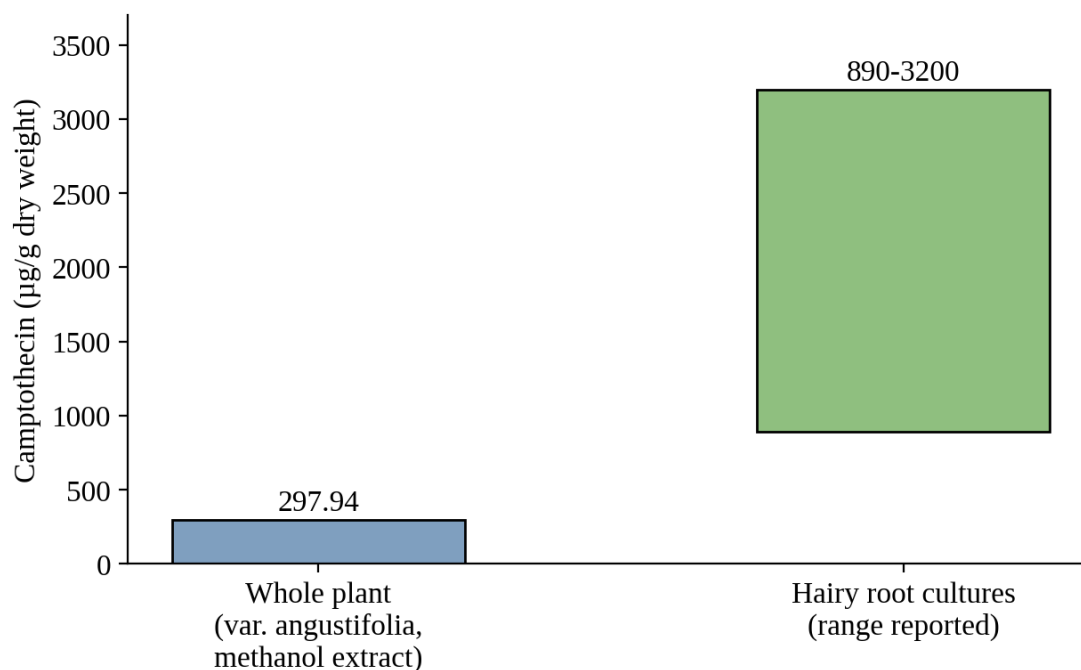


Figure 2. Camptothecin content in whole-plant extract versus hairy-root cultures of *O. mungos* [14,22]

VI. PHARMACOLOGICAL EVIDENCE

6.1 Antivenom (*vishaghna*) activity

The strongest experimental support for the classical *vishaghna* claim is a chick-embryo yolk-sac study. The median lethal dose of *Daboia russelii* venom in 6-day-old embryos was 3 $\mu\text{g}/\mu\text{l}$; pre-incubating venom with root extract at 10 $\mu\text{g}/\mu\text{l}$ gave 100% embryo recovery after 6 h, and higher concentrations abolished haemorrhagic lesions [6]. Limitations include an embryonic model, pre-incubation rather than post-venomation rescue, and the absence of an isolated active principle or mammalian data.

6.2 Camptothecin and anticancer potential

Camptothecin traps the DNA topoisomerase I cleavable complex and disrupts cell division [24,25]. Its water-soluble analogues topotecan and irinotecan are established anticancer drugs, and recent reviews summarise newer derivatives and clinical prospects [8,25]. Beyond camptothecin, *O. mungos* extracts showed concentration-dependent antioxidant and antiproliferative activity against cancer cell lines in a screen of ten Indian medicinal plants [26], and luteolin-7-*O*-glucoside isolated from its leaves suppressed aberrant crypt foci in a rat model of chemically induced colon carcinogenesis [19]. *O. mungos* is nevertheless valued as a renewable source of leads, not as a treatment: no evidence shows that crude *Sarpakshi* is itself an anticancer therapy [14].

6.3 Antiviral, antioxidant and antimicrobial activity

The 1976 isolation paper reported camptothecin and 10-methoxycamptothecin as antiviral constituents of *O. mungos* [15]. Hexane and methanol extracts of var. *angustifolia* showed moderate antioxidant capacity in DPPH, reducing-power, phosphomolybdate and nitric oxide assays [14], and a methanolic extract of Sri Lankan material showed significant nitric oxide-scavenging activity [27]. Antimicrobial activity is supported at the genus level [7].

6.4 Recent research (2020–2026)

Recent work has moved in three directions. First, the genus review of 2020 and the 2022 update on *Ophiorrhiza* chemistry consolidated the distribution, alkaloid diversity and biosynthetic understanding [7,20]. Second, leaf extracts of *O. mungos* were used to make silver nanoparticles of about 17 nm, smaller than those from *O. harrisiana* (22 nm) and *O. rugosa* (26 nm), with size-dependent antibacterial activity that was highest against *Vibrio cholerae*, plus antifungal activity [28]. The same nanoparticles removed $88.1 \pm 1.74\%$ of methylene blue within 1 h [29] and degraded Congo red (82.35%) and Eriochrome black T (92.88%) in sunlight, remaining reusable for five cycles [30]. Although these are environmental applications, they confirm the strong reducing and capping capacity of the plant's phytochemicals. Third, a 2026 screen of 175 endophytic microorganisms from *O. mungos* found 17 camptothecin producers (14 bacterial and 3 fungal), mostly from root tissue, opening a route to fermentation-based supply [31]. Table 6 collates these studies, and Figure 3 places them on a timeline of research milestones.

Table 6. Recent studies on *Ophiorrhiza mungos* (2020–2026)

Year	Study type	Key finding	Source
2020	Genus review	Consolidated distribution, uses, phytochemistry and propagation of <i>Ophiorrhiza</i>	[7]
2022	Chemistry review	About 50 alkaloids described from the genus; biosynthetic pathways proposed	[20]
2023	Green nanoparticle synthesis	17 nm AgNPs with size-dependent antibacterial and antifungal activity	[28]
2024	Nano-adsorbent	$88.1 \pm 1.74\%$ methylene blue removal in 1 h	[29]
2025	Photocatalysis	82.35% (Congo red) and 92.88% (Eriochrome black T) degradation; reusable for 5 cycles	[30]
2026	Endophyte screen	17 of 175 endophytes produced camptothecin (14 bacterial, 3 fungal)	[31]

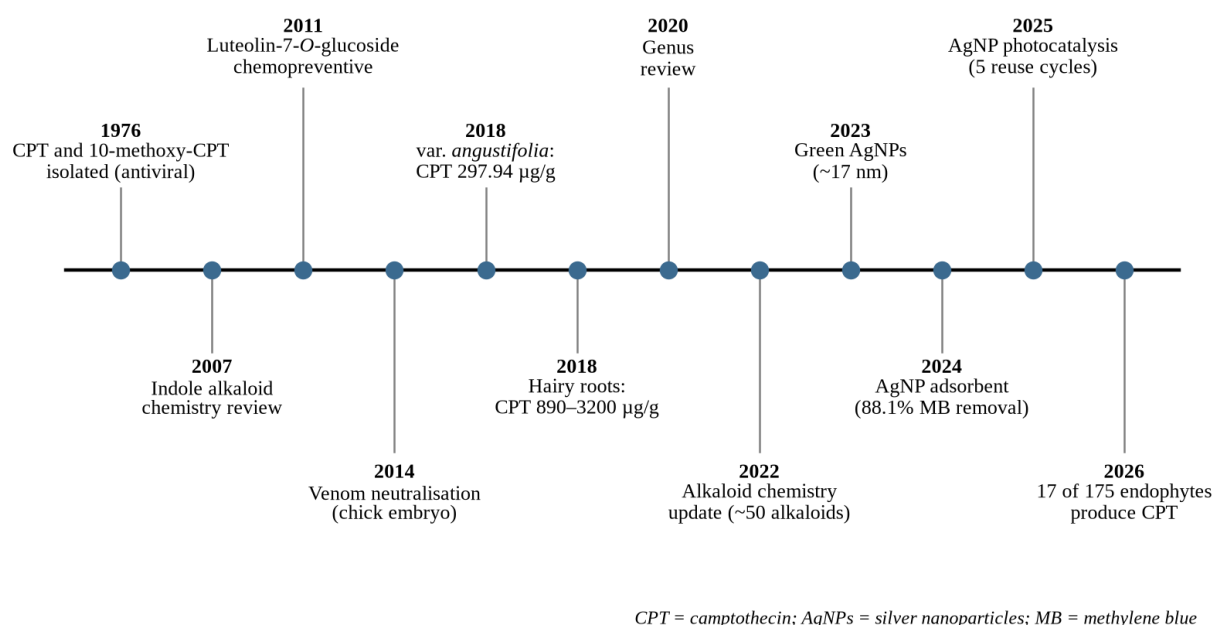


Figure 3. Timeline of key research milestones on *O. mungos*, 1976–2026 [6,7,14,15,19–22,28–31]

6.5 If *Sarpakshi* is *Polygonum plebeium*

For the alternative identity, preclinical reports describe polyphenolic, antioxidant and cardioprotective properties of *P. plebeium* extract [32]. No antivenom or camptothecin data were found for this species, so the evidence for the two plants must not be combined.

VII. BIOTECHNOLOGY AND SUSTAINABLE SUPPLY

Wild collection threatens populations, so tissue culture and microbial routes have been explored. Hairy roots of *O. mungos* transformed with *Agrobacterium rhizogenes* yielded 890–3200 µg/g dry weight [22], and the genus review notes elicitation and root-culture strategies that raise output [7]. Endophytes offer an additional route: in the 2026 screen, bacterial producers outnumbered fungal ones (Figure 4), and the work reported camptothecin synthesis for the first time in several bacterial genera [31].

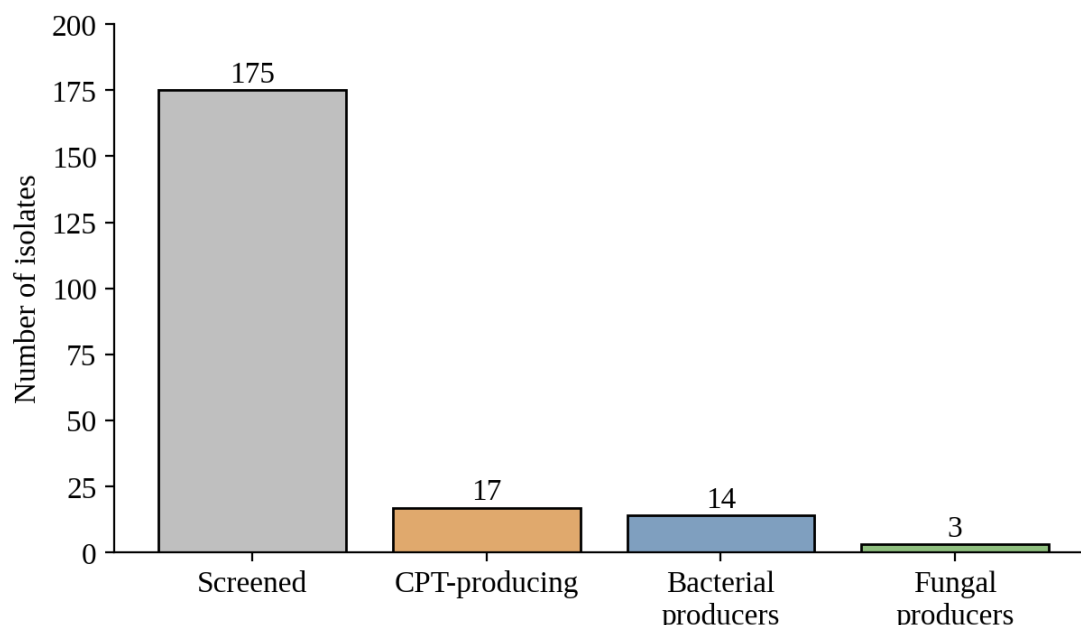


Figure 4. Camptothecin-producing endophytes among 175 isolates from *O. mungos* [31]

VIII. BRIDGING CLASSICAL CLAIMS AND MODERN EVIDENCE

Table 7 maps each classical *karma* to the experimental evidence located. The exercise shows where the tradition is supported, where it is untested, and where new hypotheses arise.

Table 7. Correlation of classical actions with contemporary evidence

Classical <i>karma</i>	Modern evidence located	Strength	Source
<i>Sarpa-vishaghna</i> (snake poison)	Venom neutralisation in chick-embryo model	Preclinical, limited	[6]
<i>Vrishchika</i> -, <i>undura</i> -, <i>luta-vishaghna</i> (scorpion, rat, spider)	No specific experimental study located	None	[1,9]
<i>Krimighna</i> (worms, infection)	Antimicrobial and antiviral activity; no anthelmintic study located	Indirect	[7,15,28]
<i>Vrana-ropana</i> (wound healing)	Antioxidant and antibacterial data; leaves traditionally used to dress ulcers; no wound model located	Indirect	[2,14,28]
<i>Jvarahara</i> (fever)	No study located	None	[1]

IX. SAFETY AND TOXICITY

Popular Ayurvedic sources report no recorded side effects but caution that a high dose may cause gastric irritation, attributed to the hot potency [16]; these statements are not based on formal toxicology. The leaves and stems are reported to contain traces of hydrocyanic acid [2]. Camptothecin is cytotoxic, and its natural form is limited by poor solubility and toxicity [7], so crude preparations require acute, sub-chronic and genotoxicity studies. Misidentification with *Rauvolfia serpentina* would expose patients to hypotensive and sedative alkaloids [1], which underlines the need for authentication.

X. RESEARCH GAPS AND FUTURE DIRECTIONS

Priorities are: (i) critical textual study of primary *samhita* and Nighantu manuscripts to fix identity, dose and *anupana*; (ii) pharmacognostic and DNA-barcode authentication; (iii) marker-based standardisation using HPLC or HPTLC [23]; (iv) bioassay-guided isolation of venom-neutralising principles, tested against venom enzymes and in mammalian models against standard antivenom; (v) experiments on the untested classical claims in Table 7, especially *krimighna* and *vrana-ropana* activity; (vi) toxicological profiling; and (vii) scalable supply through hairy roots and endophytes [22,31]. Only then are clinical studies warranted.

XI. CONCLUSION

Classical literature describes *Sarpakshi* and *Nakuli* as pungent-bitter, hot drugs for animal poisoning, worms and wounds. Modern research on *Ophiorrhiza mungos*, the best-supported botanical candidate, gives partial preclinical support for the antidotal claim and reveals camptothecin as a valuable constituent, with recent work extending to nanotechnology and endophyte biotechnology. Identity disputes, missing dose data and the absence of human trials remain the main barriers. Integrating textual scholarship with standardised laboratory work offers the most credible route to validating this drug.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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