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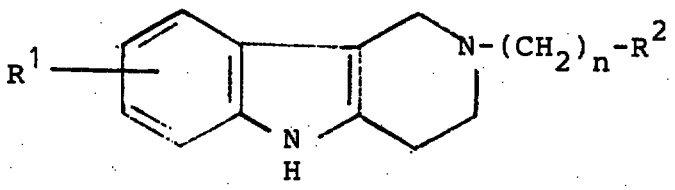
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GAMMA-CARBOLINES

Gamma-carbolines possessing central nervous system activity are known. Representative of the compounds found in the literature are those disclosed by Plattner et al., U.S. 4,001,263 and Welch, U.S. 4,224,329 as 2-substituted-5-aryl-tetra-and hexahydro-pyrido[4,3-b]indoles. Each reference discloses preferred phenyl(oxy or oxo)alkyl substitution in 2-position.

In accordance with this invention there is provided a group of tetrahydro-2-heterocyclolalkyl-pyrido[4,3-b]indoles which possess antipsychotic and anxiolytic properties useful in the treatment of psychological disorders such as paranoia and schizophrenia and states of anxiety.

The compounds of this invention present the structural formula:

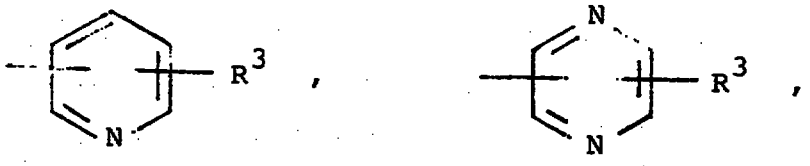


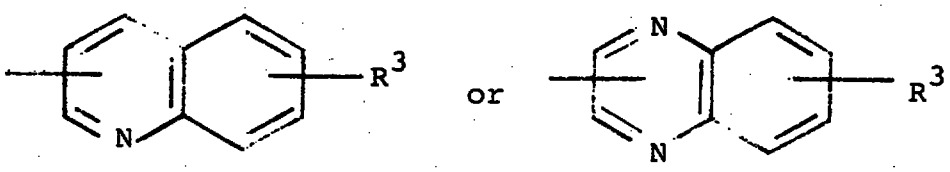
(I)

in which

R^1 is hydrogen, halogen, hydroxy or alkyl of 1 to 6 carbon atoms;

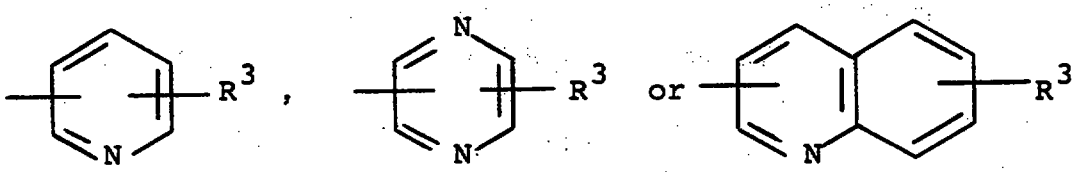
R^2 is





where R^3 is hydrogen, alkyl of 1 to 6 carbon atoms, alkoxy of 1 to 6 carbon atoms, $-CO_2R^4$ (where R^4 is alkyl of 1 to 6 carbon atoms), halogen, cyano or nitro;
and n is one of the integers 2,3,4,5 or 6; or a pharmaceutically acceptable salt thereof.

Preferred compounds of the invention are those in which R^1 is hydrogen or halogen; those in which R^2 is

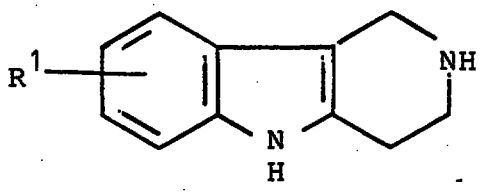


where R^3 is hydrogen, alkyl of 1 to 4 carbon atoms, alkoxy of 1 to 4 carbon atoms, $-CO_2R^4$ (where R^4 is alkyl of 1 to 4 carbon atoms), halogen, cyano or nitro; and those in which n is one of the integers 2,3 or 4; and the pharmaceutically acceptable salts thereof.

In the preceding descriptions of the compounds of this invention, the term "halogen" refers to chlorine, bromine and fluorine and the pharmaceutically acceptable salts may be derived from such organic and inorganic acids as: acetic, lactic, citric, tartaric, succinic, maleic, malonic, gluconic, hydrochloric, hydrobromic, phosphoric, nitric, sulfuric, methanesulfonic and similarly known acceptable acids. The pharmaceutically acceptable salts may be obtained by reaction of the free base with an appropriate organic or inorganic acid.

The compounds of the invention may be readily prepared by conventional methods. For example an appropriately

substituted gamma-carboline of formula (II)



(II)

(where R^1 has the meaning given above) may be alkylated to provide the group $-(CH_2)_n-R^2$ (where n and R^2 have the meanings given above) at the 2-position. The alkylating agent may be, for example, an appropriate haloalkylpyridine, haloalkylpyrazine, haloalkylquinoline or haloalkylquinoxaline, e.g. of formula

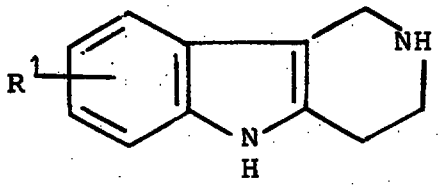
$$X-(CH_2)_n-R^2 \qquad \text{(III)}$$

(where n and R^2 are as defined above and X is Br or Cl) or an appropriate vinylpyridine, vinylpyrazine, vinylquinoline or vinylquinoxaline, e.g. of formula

$$CH_2=CH-R^2 \qquad \text{(IV)}$$

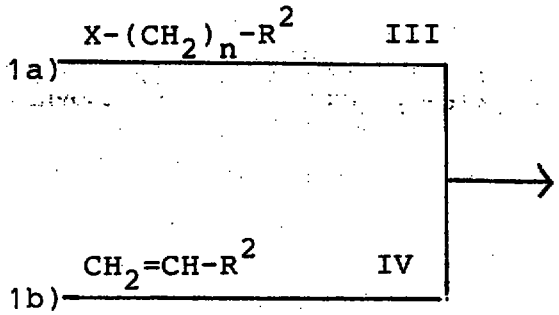
(where R^2 is as defined above). The reaction is illustrated in Scheme 1 below.

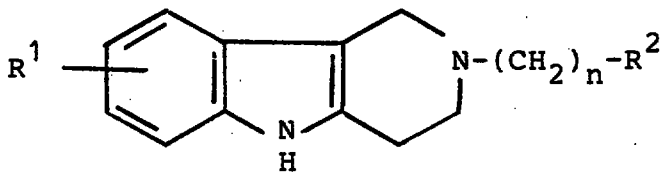
Scheme 1



(II)

+





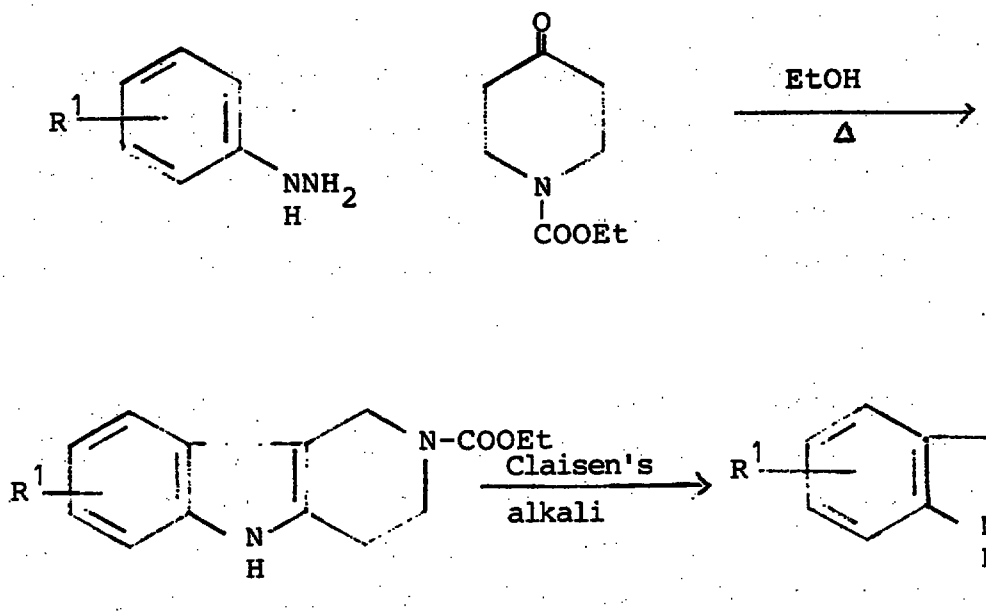
(I)

The nucleophilic substitution reaction (1a) may be run in an aprotic solvent, such as dimethylformamide (DMF), dimethylsulfoxide (DMSO), acetone or alcoholic acetonitrile in the presence of a mild base such as sodium, potassium or cesium carbonate or a combination of two different carbonates.

The vinyl Michael addition reaction (1b) may be used where compounds of the invention having n=2 are desired. The reactions are conveniently run in an alcoholic solvent, preferably methanol or ethanol, e.g. in the presence of a catalytic amount of glacial acetic acid. These reactions are preferably run at solvent reflux temperatures for, e.g. 24-48 hours.

The starting γ-carboline II in Scheme I (above)may be prepared from substituted phenylhydrazines and N-carbethoxy-4-piperidone as shown, for example, in Scheme 2.

Scheme 2



The antipsychotic properties of the compounds of this invention were established by standard pharmacologically accepted procedures involving two conditioned avoidance studies in which trained male CD rats (Charles River), 400-450 gm body weight are exposed to a fifteen second warning tone (conditioned stimulus) continued for an additional fifteen seconds accompanied by electric shock. The rat can avoid the electric shock by depression of a response lever (lever-response) or in a different study by jumping to an exposed shelf (shelf-jump response). In either test situation, a response during the initial warning tone is considered an avoidance response while a response during shock delivery is considered an escape response. The avoidance response is determined and expressed as a percentage of total trials from an appropriate number of trials and a 50% block in avoidance responding (AB_{50}) is obtained from a dose-effect regression line. The shelf-jump response test procedure follows that of Herman et al., Comm. in Psychopharm., 3, pp. 165-171 (1979).

As a measure of extrapyramidal side effects, the compounds of this invention were studied as antagonists of apomorphine-induced stereotyped behavior wherein CF-1 mice (Charles River) receive the test compound i.p. (six mice per dose level) and thirty minutes later receive 10 mg/kg apomorphine s.c. Five minutes after injection, the rearing-head-bobbing-licking syndrome induced by apomorphine is evaluated as present or absent for each animal. Readings are

repeated every five minutes during a thirty minute test session. An ED_{50} value (with 95% confidence intervals) is calculated for inhibition of apomorphine-induced stereotyped behavior by simple linear regression analysis. The compounds of this invention were inactive in this study, demonstrating a low potential for side-effects attending long term treatment with such standard antipsychotic drugs as haloperidol and chlorpromazine.

In further support of the low potential for side-effects exhibited by the compounds of this invention, the compounds were tested in accordance with a modification of the procedure of Fields et al., Brain Res., 136, pp. 578-584 (1977) and Yamamura et al., eds., Neurotransmitter Receptor Binding, Raven Press, N.Y. (1978), wherein homogenized limbic brain tissue is incubated with ^{3}H-spiroperidol and various concentrations of test compound, filtered and washed and shaken with Hydrofluor scintillation cocktail (National Diagnostics) and counted in a Packard 460CD scintillation counter. Binding in the presence of the test compound is expressed as a percent of specific binding (total binding less binding in the presence of 1 μM (+)butaclamol). An inhibition constant (K_i) is calculated for each test compound to catagorize its limbic D-2 binding potential. The larger the number, the less potential for dopamine receptor binding and attendant side effects from administration of the antipsychotic agent. Inhibition constants (95% confidence interval) for standard antipsychotics are:

haloperidol - 4.0 (3.0-5.6)nM;
clozapine - 34 (23-54)nM;
fluphenazine - 4.5 (3.6-5.6)nM; and
sulpiride - 376 (174-5000)nM

In an analogous test procedure employing brain cortical tissue, the compounds of this invention which have been tested demonstrated an equal or greater potency than serotonin for binding at serotonin-2 receptors. Serotonin exhibits a K_i in this study of 20 (14-30) μM while dopamine is inactive.

From these data, the activity profile of the compounds of this invention are seen to be that of antipsychotic agents with much lower potential for extra pyramidal side effects such as attend the use of major tranquillizers (sedation, pseudoparkinsonism, ataxia, muscle relaxation, etc.). This activity profile resembles that of the anxiolytic compound, buspirone.

Hence, the compounds of this invention are antipsychotic agents and anxiolytic agents useful in the treatment of psychoses such as paranoia and schizophrenia and in alleviating anxiety. As such, they may be administered neat

or with a pharmaceutical carrier to a patient in need thereof. The pharmaceutical carrier may be solid or liquid.

A solid carrier can include one or more substances which may also act as flavouring agents, lubricants, solubilisers, suspending agents, fillers, glidants, compression aids, binders or tablet-disintegrating agents; it can also be an encapsulating material. In powders the carrier is a finely divided solid which is in admixture with the finely divided active ingredient. In tablets the active ingredient is mixed with a carrier having the necessary compression properties in suitable proportions and compacted in the shape and size desired. The powders and tablets preferably contain up to 99% of the active ingredient. Suitable solid carriers include, for example, calcium phosphate, magnesium stearate, talc, sugars, lactose, dextrin, starch, gelatin, cellulose, methyl cellulose, sodium carboxymethyl cellulose, polyvinylpyrrolidine, low melting waxes and ion exchange resins.

Liquid carriers are used in preparing solutions, suspensions, emulsions, syrups, elixirs and pressurized compositions. The active ingredient can be dissolved or suspended in a pharmaceutically acceptible liquid carrier such as water, an organic solvent, a mixture of both or pharmaceutically acceptable oils or fats. The liquid carrier can contain other suitable pharmaceutical additives such as solubilisers, emulsifiers, buffers, preservatives, sweeteners, flavouring agents, suspending agents, thickening agents, colours, viscosity regulators, stabilisers or osmo-regulators. Suitable examples of liquid carriers for oral and parenteral administration include water (particularly containing additives as above e.g. cellulose derivatives, preferably sodium carboxymethyl cellulose solution), alcohols (including monohydric alcohols and polyhydric alcohols e.g.. glycols) and their derivatives, and oils (e.g. fractionated coconut oil and arachis oil). For parenteral administration the carrier can also be an oily ester such as ethyl oleate and isopropyl myristate. Sterile liquid carriers are used in sterile liquid form compositions for parenteral administration. The liquid carrier for pressurized compositions can be halogenated hydrocarbon or other pharmaceutically acceptable propellent.

Liquid pharmaceutical compositions which are sterile solutions or suspensions can be utilized by, for example, intramuscular, intraperitoneal or subcutaneous injection. Sterile solutions can also be administered intravenously. When the compound is orally active it can be administered orally either in liquid or solid composition form.

Preferably the pharmaceutical composition is in unit dosage form, e.g. as tablets or capsules. In such form, the composition is sub-divided in unit dose containing appropriate quantities of the active ingredient; the unit dosage forms can be packaged compositions, for example packeted powders, vials, ampoules, prefilled syringes or sachets containing liquids. The unit dosage form can be, for example, a capsule or table itself, or it can be the appropriate number of any such compositions in package form.

The dosage to be used in the treatment of a specific psychosis must be subjectively determined by the attending physician. The variables involved include the specific psychosis or state of anxiety and the size, age and response pattern of the patient.

The following examples illustrate the production of compounds of this invention. After each example the pharmacological evaluation for the compound produced is presented. The conditioned avoidance tests are reported as relative activity for the shelf-jump (S-J) at the intraperitoneal (i.p.) dose administered in mg/kg and the AB_{50} is presented for the lever-response (L-R) test at the oral (p.o.) dose in mg/kg. The inhibition constant is reported for limbic D-2 binding expressed in nM concentration. Similarly, the inhibition constant for cortical 5-HT_2 binding is reported as the inhibition constant in nM concentration. All of the compounds were inactive as apomorphine antagonists.

Example 1

8-Fluoro-2,3,4,5-tetrahydro-2-[4-(4-pyridinyl)butyl]-1H-pyrido[4,3-b]-indole

To a stirred suspension of 8-fluoro-2,3,4,5-tetrahydro-1H-pyrido[4,3-b]-indole (1.5 g, 0.0079 mol), freshly baked anhydrous sodium carbonate (1.7 g, 0.016 mol) and catalytic amount of cesium carbonate in 70 mL of dimethylformamide, was added 2.33 g (0.016 mol) of 4-(4-pyridinyl)butyl bromide hydrobromide.

The reaction was stirred overnight at room temperature, then the solvent was removed under vacuum and the solid cake was suspended in 100 mL of water and extracted with methylene chloride (3 x 100 mL).

The methylene chloride extracts were combined, dried over anhydrous sodium sulfate and evaporated under reduced pressure. The title compound was separated by HPLC using ethyl acetate as the eluent to afford 2.3 g (92% yield) of the title compound which was converted to the dihydrochloride salt; mp 210-212°C.

Analysis for: $C_{20}H_{22}N_3F \cdot 2HCl \cdot H_2O$
Calculated: C, 57.97; H, 6.3; N, 10.14
Found: C, 57.67; H, 5.78; N, 10.29
S-J Active (20)
L-R 15.11 p.o. (10.38-34.33)
Limbic D-2 143 (92-214)
Cortical 5-HT_2 480 (140-980)

Example 2

8-Fluoro-2,3,4,5-tetrahydro-2-[2-(2-pyridinyl)ethyl]-1H-pyrido[4,3-b]indole

A mixture of 8-fluoro-2,3,4,5-tetrahydro-1H-pyrido[4,3-b]indole 3.2 g (0.016 mol), 2-vinylpyridine (1.79 g, 0.017 mol), and 2 mL of glacial acetic acid were refluxed for 48 hours in 30 mL of methanol. The solvent was removed in vacuo and the separated solid was purified by HPLC and converted to the dihydrochloride salt to afford 2.5 g (38% yield) of the title compound; mp 199-201°C.

Analysis for; $C_{18}H_{18}N_3F \cdot 2HCl \cdot H_2O$
Calculated: C, 55.96; H, 5.7; N, 10.88
Found: C, 56.51; H, 5.39; N, 10.96
S-J Active (20)
L-R 37.64 p.o. (20.86-322.08)
Limbic D-2 26 (13-42)
Cortical 5-HT_2 173 (139-220)

Example 3

2,3,4,5-Tetrahydro-2-[2-(2-pyridinyl)ethyl]-1H-pyridol[4,3-b]indole

The title compound was prepared following the procedure of Example 2 with the exception that 2,3,4,5-tetrahydro-1H-pyrido[4,3-b]indole was used instead of 8-fluoro-2,3,4,5-tetrahydro-1H-pyrido[4,3-b]indole. The product converted to the dihydrochloride salt; mp. 189-191°C.

Analysis for: $C_{18}H_{19}N_3 \cdot 2HCl \cdot 1/2H_2O$
Calculated: C, 57.29; H, 6.4; N, 11.13, Cl, 18.79
Found: C, 57.4; H, 6.36; N, 10.97; Cl, 18.95
S-J Activity (40)
L-R Very weak (40 p.o.)
Limbic D-2 33% at 1 μM

Example 4

8-Fluoro-2,3,4,5-tetrahydro-2-[2-(2-quinolinyl)ethyl]-1H-pyrido[4-3-b]indole

The title compound was prepared following the procedure of Example 2 with the exception that 2-vinylquinoline was used instead of 2-vinylpyridine. The product was converted to the dihydrochloride salt; mp 192-194°C.

Analysis for: $C_{22}H_{20}N_3F \cdot 2HCl$
Calculated: C, 62.63; H, 5.45; N, 9.96
Found: C, 62.57; H, 5.30; N, 9.43
S-J Active (20)
Limbic D-2 185 (no C.I.)

Example 5

2,3,4,5-Tetrahydro-2-[2-(2-quinolinyl)ethyl]-1H-pyrido[4,3-b]indole

The title compound was prepared following the procedure of Example 2 with the exception that 2,3,4,5-tetrahydro-1H-pyrido[4,3-b]indole was used instead of 8-fluoro-2,3,4,5-tetrahydro-1H-pyrido[4,3-b]indole and 2-vinylquinoline replaced 2-vinylpyridine. The product was converted to the dihydrochloride; mp 195-197°C.

Analysis for: $C_{22}H_{21}B_3 \cdot 2HCl \cdot 1\ 1/2H_2O$
Calculated: C, 61.83; H, 6.13; N, 9.83, Cl, 16.6
Found: C, 62.24; H, 5.89; N, 9.59; Cl, 16.12
S-J Active (40)
L-R Weak (40 p.o.)
Limbic D-2 331 (238-410)

Example 6

2,3,4,5-Tetrahydro-2-[4-(4-pyridinyl)butyl]-1H-pyrido[4,3-b]indole

The title compound was prepared following the procedure of Example 1 with the exception 2,3,4,5-tetrahydro-1H-pyrido[4,3-b]indole was used instead of 8-fluoro-2,3,4,5-tetrahydro-1H-pyrido[4,3-b]indole. The product was converted to the dihydrochloride salt; mp 204-206°C.

Analysis for: $C_{20}H_{23}N_3 \cdot 2HCl \cdot H_2O$
Calculated: C, 60.60; H, 6.80; N, 10.60
Found: C, 60.87; H, 6.79; N, 10.62
S-J Active (20,40)
L-R >20 p.o.
Limbic D-2 41% at 1 μM

Example 7

2,3,4,5-Tetrahydro-2-[3-(3-pyridinyl)propyl]-1H-pyrido[4,3-b]indole

The title compound was prepared following the procedure of Example 1 with the exception 2,3,4,5-tetrahydro-1H-pyrido[4,3-b]indole was used instead of 8-fluoro-2,3,4,5-tetrahyro-1H-pyrido[4,3-b]indole and 3-(3-pyridinyl)propyl bromide hydrobromide replaced the 4-(4-pyridinyl)butyl bromide salt. The product was converted to the dihydrochloride salt; mp 223-225°C.

Analysis for; $C_{19}H_{21}N_3 \cdot 2HCl \cdot H_2O$
Calculated: C, 59.68; H, 6.54; N, 10.99, Cl, 18.58
Found: C, 60.78; H, 6.26; N, 11.08; Cl, 18.80
S-J Active (40)
L-R 33.09 p.o. (25.58-50.65)
Limbic D-2 43% at 1 μM
Cortical 5-HT_2 252 (197-341)

Example 8

8-Chloro-2,3,4,5-tetrahydro-2-[4-(4-pyridinyl)butyl]-1H-pyrido[4,3-b]indole

The title compound was prepared following the procedure of Example 1 with the exception that 8-chloro-2,3,4,5-tetrahydro-1H-pyrido[4,3-b]indole was used instead of 8-fluoro-2,3,4,5-tetrahydro-1H-pyrido[4,3-b]indole. The product was converted to the dihydrochloride salt; mp 227-228°C.

Analysis for: $C_{20}H_{22}ClN_3 \cdot 2HCl \cdot H_2O$
Calculated: C, 55.74; H, 6.03; N, 9.75
Found: C, 55.74; H, 5.86; N. 9.61
S-J Active (40)
L-R 36.08 p.o. (21.51-59.35)
Limbic D-2 106 (26-263)
Cortical 5-HT_2 60 (29-132)

Example 9

8-Chloro-2,3,4,5-tetrahydro-2-[2-(2-pyridinyl)ethyl]-1H-pyrido[4,3-b]indole

The title compound was prepared following the procedure of Example 2 with the exception that 8-chloro-2,3,4,5-tetrahydro-1-H-pyrido[4,3-b]indole was used instead of 8-fluoro-2,3,4,5-tetrahydro-1H-pyrido[4,3-b]indole. The product was converted to the dihydrochloride salt; mp. 198-200°C.

Analysis for: $C_{20}H_{22}ClN_3 \cdot 2HCl \cdot H_2O$
Calculated: C, 53.67; H, 5.5: N, 10.43
Found: C, 53.32; H, 5.3; N, 10.21
S-J Active (40)
L-R > 40 p.o.
Limbic D-2 103 (72-141)

Example 10

8-Chloro-2,3,4,5-tetrahydro-2-[2-(2-quinolinyl)ethyl]-1H-pyrido-[4,3-b]indole

The title compound was prepared following the procedure of Example 2 with the exception that 8-chloro-2,3,4,5-tetrahydro-1H-pyrido[4,3-b]indole was used instead of 8-fluoro-2,3,4,5-tetrahydro-1H-pyrido[4,3-b]indole and 2-vinylquinoline was used instead of 2-vinylpyridine. The product was converted to the dihydrochloride salt; mp 187-190°C.

Analysis for: $C_{22}H_{20}ClN_3 \cdot 2HCl \cdot H_2O$
Calculated: C,58.37; H, 5.19; N, 9.27
Found: C, 58.34; H, 5.30; N, 9.29
S-J Active (40)
L-R > 40 p.o.
Limbic D-2 82 (47-136)

Example 11

8-Fluoro-2,3,4,5-tetrahydro-2-[3-(3-pyridinyl)propyl]1H-pyrido[4,3-b]indole

The title compound was prepared following the procedure of Example 1 with the exception that 3-(3-pyridinyl)propyl bromide hydrobromide was used instead of 4-pyridinylbutyl bromide hydrobromide. The product was converted to the dihydrochloride salt; mp. 215-218°C.

Analysis for: $C_{19}H_{20}FN_3 \cdot HCl \cdot 1\ 1/2\ H_2O$
Calculated: C,55.74; H, 6.11; N, 10.26
Found: C,56.06; H, 5.60; N, 10.51
S-J Active (20)
L-R 14.42 p.o. (9.94-30.74)
Limbic D-2 395 (165-848)
Cortical 5-HT_2 136 (76-299)

Example 12

8-Chloro-2,3,4,5-tetrahydro-2-[3-(2-pyridinyl)-propyl]-1H-pyrido[4,3-b]indole

The title compound was prepared following the procedure of Example 1 with the exception that 3-(2-pyridinyl)propyl bromide hydrobromide was used instead of 4-(4-pyridinyl)butyl bromide hydrobromide and 8-chloro-2,3,4,5-tetrahydro-1H-pyrido[4,3-b]indole was used instead of 8-fluoro-2,3,4,5-tetrahydro-1H-pyrido[4,3-b]indole. The product was converted to the dihydrochloride salt; mp. 240-242°C.

Analysis for: $C_{19}H_{20}ClN_3 \cdot 2HCl$
Calculated: C, 57.22; H, 5.56; N, 10.54
Found: C, 57.60; H, 5.49; N, 10.68
S-J Active (40 i.p.)
L-R > 40 p.o.
Limbic D-2 126 (85-183)
Cortical 5-HT_2 28 (12-66)

Example 13

8-Fluoro-2,3,4,5-tetrahydro-2-[2-(4-pyridinyl)ethyl]1H-pyrido[4,3-b]indole

The title compound was prepared following the procedure of Example 2 with the exception 4-vinylpyridine was used instead of 2-vinylpyridine. The product was converted to the dihydrochloride salt; mp.233-235°C.

Analysis for:	$C_{18}FN_3.2HCl$
Calculated:	C,58.69;H,5.43:N,11.41
Found:	C,58.55;H,5.42;N,11.18
	S-J Active(40 i.p.)
	L-R 22.85(11.34-80.89)
	Limbic D-2 110(39-274)
	Cortical 5-HT_2 211(165-263)

Example 14

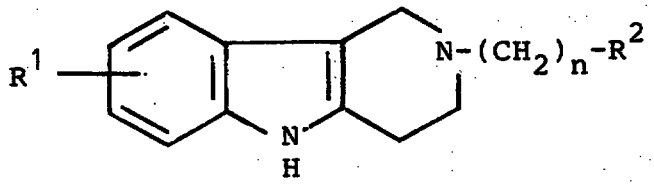
8-Fluoro-2,3,4,5-tetrahydro-2-[3-(4-pyridinyl)propyl]-1H-pyrido[4,3-b]indole, dihydrochloride, hydrate

The title compound is prepared following the procedure of Example 1, using 3-(4-pyridinyl)propyl bromide hydrobromide instead of 4-(4-pyridinyl)butyl bromide hydrobromide and is converted to the hydrochloride salt, m.p.203-205°C.

Analysis for:	$C_{19}H_{20}N_3F.2HCl.H_2O$
Calculated:	C,57.00;H,6.00;N,10.5;Cl,17.75
Found;	C,57.48;H,6.00;N,10.39;Cl,17.95,

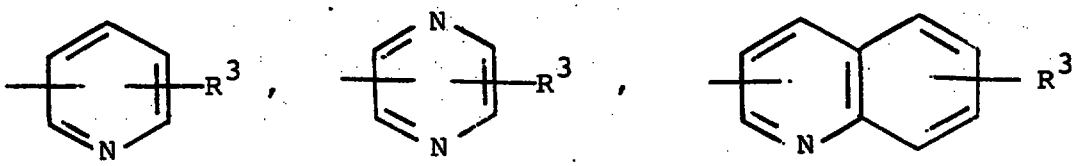
CLAIMS

1. A compound of the general formula:

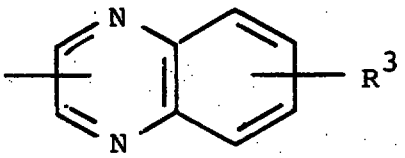


(I)

in which R^1 is hydrogen, halogen, hydroxy or alkyl of 1 to 6 carbon atoms; R^2 is

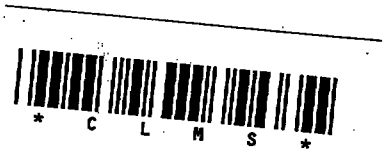


or

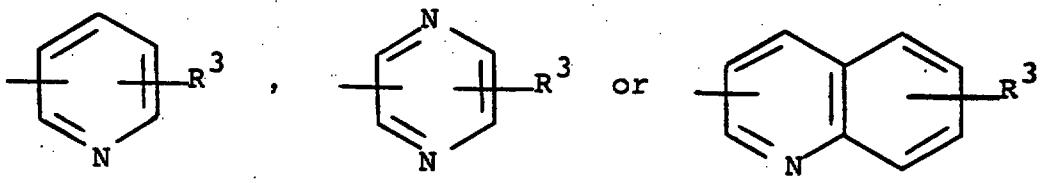


where R^3 is hydrogen, alkyl of 1 to 6 carbon atoms, alkoxy of 1 to 6 carbon atoms, $-CO_2R^4$ (where R^4 is alkyl of 1 to 6 carbon atoms), halogen, cyano or nitro; and n is one of the integers 2, 3, 4, 5 or 6; or a pharmaceutically acceptable salt thereof.

2. A compound as claimed in Claim 1 in which R^1 is hydrogen or halogen.



3. A compound as claimed in Claim 1 or 2 in which R^2 is



where R^3 is hydrogen, alkyl of 1 to 4 carbon atoms, alkoxy of 1 to 4 carbon atoms; $-CO_2R^4$ (where R^4 is alkyl of 1 to 4 carbon atoms), halogen, cyano or nitro.

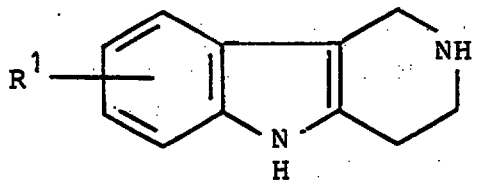
4. A compound as claimed in any one of Claims 1 to 3 in which n is one of the integers 2, 3 or 4.

5. A compound as claimed in Claim 1 which is 8-fluoro-2,3,4,5-tetrahydro-2-[4-(4-pyridinyl) butyl]-1H-pyrido[4,3-b]-indole or a pharmaceutically acceptable salt thereof; 8-fluoro-2,3,4,5-tetrahydro-2-[2-(2-pyridinyl) ethyl]-1H-pyrido[4,3-b]indole or a pharmaceutically acceptable salt thereof; 2,3,4,5-tetrahydro-2-[2-(2-pyridinyl) ethyl]-1H-pyrido[4,3-b]indole or a pharmaeutically acceptable salt thereof; 8-fluoro-2,3,4,5-tetrahydro-2-[2-(2-quinolinyl)ethyl]-1H-pyrido[4,3-b]indole or a pharmaceutically acceptable salt thereof; 2,3,4,5-tetrahydro-2-[2-(2-quinolinyl) ethyl]-1H-pyrido[4,3-b]indole or a pharmaceutically acceptable salt thereof; 2,3,4,5-tetrahydro-2-[4-(4-pyridinyl)butyl]-1H-pyrido[4,3-b]indole or a pharmaceutically acceptable salt thereof; 2,3,4,5-tetrahydro-2-[3-(3-pyridinyl)propyl]-1H-pyrido[4,3-b]indole or a pharmaceutically acceptable salt thereof; 8-chloro-2,3,4,5-tetrahydro-2-[4-(4-pyridinyl)butyl]-1H-pyrido

[4,3-b]indole or a pharmaceutically acceptable salt thereof; 8-chloro-2,3,4,5-tetrahydro-2-[2-pyridinyl) ethyl]-1H-pyrido[4,3-b]indole or a pharmaceutically acceptable salt thereof; 8-chloro-2,3,4,5-tetrahydro-2-[2-(2-quinolinyl)ethyl]-1H-pyrido-[4,3-b]indole or a pharmaceutically acceptable salt thereof; 8-chloro-2,3,4,5-tetrahydro-2-[3-(2-pyridinyl)-propyl]-1H-pyrido[4,3-b]indole or a pharmaceutically acceptable salt thereof or 8-fluoro-2,3,4,5-tetrahydro-2-[2-(4-pyridinyl)ethyl]1H-pyrido[4,3-b]indole or a pharmaceutically acceptable salt thereof.

6. A compound as claimed in Claim 1 which is 8-fluoro-2,3,4,5-tetrahydro-2-[3-(3-pyridinyl)propyl]1H-pyrido[4,3-b]indole or a pharmaceutically acceptable salt thereof.

7. A process for preparing a compound claimed in Claim 1 which comprises alkylating a gamma-carboline of general formula (II)



(II)

(where R^1 has the meaning given in Claim 1) with introduction of the group $-(CH_2)_n-R^2$ (where n and R^2 have the meanings given in Claim 1) and, if desired, converting a resulting base into a pharmaceutically acceptable salt thereof.

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8. A process as claimed in Claim 7 wherein the gamma-carboline of general formula (II) is alkylated with a haloakyl compound of formula

$$X-(CH_2)_n-R^2 \qquad (III)$$

(where n and R^2 are as defined in Claim 1 and X is bromine or chlorine) or with a vinyl compound of formula

$$CH_2=CH-R^2 \qquad (IV)$$

(where R^2 is as defined in Claim 1).

9. A process for preparing a compound as claimed in Claim 1 substantially as hereinbefore described with reference to any one of the Examples.

10. A compound as claimed in Claim 1 whenever prepared by the process claimed in any one of Claims 7 to 9.

11. A pharmaceutical composition comprising a compound as claimed in any one of Claims 1 to 6 and 10 and a pharmaceutical carrier.

12. A compound as claimed in any one of Claims 1 to 6 and 10 for use as a pharmaceutical.

13. A compound as claimed in any one of Claims 1 to 6 and 10 for use as an antipsychotic and/or anxiolytic agent.

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